



Project Document

Sustainable Energy in the Caribbean:

Reducing the Carbon Footprint in the Caribbean through the Promotion of Energy Efficiency and the Use of Renewable Energy Technologies

**Identification of mechanisms
for financing of energy
efficiency and renewable
energy initiatives to increase
investment in Saint Lucia**



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DEUTSCHE ZUSAMMENARBEIT

**Identification of mechanisms for financing of
energy efficiency and renewable energy initiatives
to increase investment in Saint Lucia**



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Contents

Acronyms.....	5
Executive Summary	9
I. Introduction.....	11
A. Background	11
B. Objectives, scope and methodology.....	13
II. The energy sector in Saint Lucia	15
A. National economy and energy sector	15
1. Update on national economy	15
2. Profile of the energy sector.....	17
B. Energy related projects and studies	20
1. Projects on policies, legal issues and barriers.....	21
2. Projects on energy efficiency and renewable energy	22
III. Financing opportunities for energy projects	25
A. Lessons learned	25
B. Process of financing	27
C. Main sources for project financing.....	31
1. Multilateral funds.....	32
2. Bilateral funds	37
3. Government Agencies.....	42
4. Carbon offsetting and Clean Development Mechanism (CDM).....	42
IV. Conclusions	45
Bibliography	47
Annexes	
Annex 1 Energy efficiency and renewable energy projects accomplished in Saint Lucia and main agencies for financing	50
Annex 2 Necessary steps for the financing process for each type of project	59
Tables	
Table 1	Gross domestic product and external debt annual average growth..... 15
Table 2	Main economic indicators..... 16
Table 3	Gross domestic product growth from different sources..... 16

Table 4	Gross domestic product and current account balance forecast.....	17
Table 5	Renewable energy status and potential.....	19
Table 6	Summary of energy efficiency and renewable energy projects implemented in Saint Lucia main agencies of financing.....	20
Table 7	Summary of relationships in RE-EE projects funding.....	31
Table 8	Types of investments per sector.....	34
Table A.1	Energy efficiency and renewable energy projects accomplished in Saint Lucia and main agencies of financing	50
Figures		
Figure 1	Historical crude oil average monthly price.....	17
Figure 2	Crude oil average quarterly price forecast.....	18
Figure 3	Investment drivers.....	30
Box		
Box 1	National energy policy at a glance.....	21

Acronyms

5Cs	Caribbean Community Climate Change Centre
ACF	Alba Caribe Fund
ADFD	Abu Dhabi Fund for Development
AFD	Agence Française de Développement
ALBA-TCP	Bolivarian Alliance for the Americas – People Treaty of Commerce
AOSIS	Alliance of Small Island States
Bls	Barrels
BMU	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Germany
BOE	Barrel of Oil Equivalent
BOEpd	Barrels of oil equivalent per day
CARICOM	Caribbean Community
CARILEC	Association of Caribbean Electric Utilities
CDB	Caribbean Development Bank
ChDB	China Development Bank
CDM	Clean Development Mechanism
CEC	Clean Energy Council
CEIS	Caribbean Energy Information Systems
CFL	Compact fluorescent lamp
CFG Services	French geothermal engineering limited company subsidiary of group BRGM
CI	Climate Institute
CIDA	Canadian International Development Agency
CIPORE	Caribbean Information Platform on Renewable Energy
CREDP	CARICOM Renewable Energy Department Programme
CREF	Caribbean Renewable Energy Facility
CRETAF	Caribbean Technical Assistance Facility
CSEP	Caribbean Sustainable Energy Project (a consortium of OAS, DSD, CARILEC, CARICOM, and REEEP)
C-SERMS	Caribbean Sustainable Energy Roadmap and Strategy
DECC	Department of Energy and Climate Change of United Kingdom
DFID	Department for International Development
DOE	U.S. Department of Energy
DSD	Department of Sustainable Development of the Organisation of American States
DSM	Demand-side management
EA	Electricity Act
EAP	Energy action plan
ECERA	Eastern Caribbean Energy Regulatory Authority
ECELP	Eastern Caribbean Energy Labelling Project
ECLAC	United Nations Economic Commission for Latin America and the Caribbean
ECPA	Energy and Climate Partnership of the Americas

EDF	European Development Fund
EE	Energy Efficiency
EERE	Energy Efficiency and Renewable Energy
EIB	European Investment Bank
EPA	Environment Protection Agency, United States of America
EPDT	Establishment, Personnel and Training Department
EST	Energy Sustainable Technologies
EU	European Union
EUEI	European Union Energy Initiative
FAO	Food and Agriculture Organisation
FI	Financial Institutions
Gal	Gallon
GDP	Gross Domestic Product
GEA	Geothermal exploration and exploitation agreement
GEF	Global Environmental Fund
GEEREF	Global Energy Efficiency and Renewable Energy Fund
Geo-Caraïbes	Eastern Caribbean Geothermal Development Project (a consortium including OAS/DSD, AFD, UNEP)
GHG	Greenhouse Gases
GIZ	Gesellschaft für Internationale Zusammenarbeit
GoSL	Government of Saint Lucia
GSEII	Global Sustainable Energy Islands Initiative (a consortium of Climate Institute, OAS/DSD, UNIDO, and other private entities)
GTZ	Gessellschaft für Technische Zusammenarbeit (German Technical Cooperation Agency)
GW	Gigawatt
IDEA	Institute for Diversification and Saving of Energy of Spain
IDB	Inter-American Development Bank
IMF	International Monetary Fund
IPP	Independent power producer
IRC	Independent Regulatory Commission
IRENA	International Renewable Energy Agency
ISO	International Organisation for Standardisation
kBoe	Thousands of barrel oil equivalent
KTOE	Thousands of tons oil equivalent
KW	Kilowatt
KWh	Kilowatt-hours
LC	Local currency
LED	Light-emitting diode
LUCELEC	Saint Lucia Electricity Services Limited
MW	Megawatt
NAMAs	Nationally Appropriate Mitigation Actions
NDF	Nordic Development Fund
NEP	National Energy Policy

NG	Natural Gas
NGO	Non-governmental organisation
NREL	National Renewable Energy Laboratory, United States Department of Energy
OAS	Organisation of American States
OECS	Organisation of Eastern Caribbean States
OLADE	Latin American Energy Organisation
OPEC	Organisation of Petroleum Exporting Countries
OTEC	Ocean Thermal Energy Conversion
PDVSA	Petróleos de Venezuela S.A.
PEMFUND	Private Energy Market Fund of Finland
PETROCARIBE	Energy Agreement between Venezuela and Caribbean States
PPA	Power Purchase Agreement
PROPARCO	French Society for the Promotion and Participation in Economic Cooperation
PV	Photovoltaic
R&D	Research and Development
RE	Renewable Energy
REEEP	Renewable Energy and Energy Efficiency Partnership
RET	Renewable Energy Technologies
SEAI	Sustainable Energy Authority of Ireland
SEIO	Sustainable Energy Initiative Organisations
SEP	Sustainable Energy Plan
SES	Sustainable Energy Strategy
SEIO	Sustainable Energy Initiative Organisations
SHC	Subsidiary Holding Company
SIDS	Small Island Developing States
SIDS-DOCK	Mechanism for addressing climate change (5Cs and SPREP)
SPREP	Secretariat of the Pacific Regional Environment Programme
SWH	Solar water heating
TOE	Ton of Oil Equivalent
UK-DFID	United Kingdom Department for International Development
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNF	United Nations Foundation
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organisation
USAID	U.S. Agency for International Development
USD	United States Dollar
VAT	Value Added Tax
VROM	Ministry of Housing, Spatial Planning and the Environment, the Netherlands
WB	World Bank
WTE	Waste to energy
WTI	West Texas Intermediate
XCD	East Caribbean Dollar

Executive Summary

Energy is critical to the functioning and growth of a society. Access to affordable and reliable energy is necessary for all sectors of the economy, including health, education, food and water security, and communication services. As a result, the living standard, level of development and competitiveness of a country are all directly linked to its access to energy.

Saint Lucia is highly dependent on imported fossil fuels for energy production, which makes the country vulnerable to price volatility and supply shortages. Also, it is well known that the initial cost of investing in renewable technologies can be prohibitive so there is a need to find ways to avert and/or reduce these costs to consumers. In addition, Saint Lucia has substantial natural energy resources with a high potential in geothermal as a reliable energy source, and a smaller scale with solar, wind and hydro power. However, renewable energy contributes less than 1 per cent to the country's energy matrix.

Therefore, the overall objective of this study is to examine financing opportunities which could provide greater incentives for the development of energy efficiency measures and deployment of renewable energy technologies.

The methodological approach of this study involved conducting a literature review related mainly to energy policies and plans.¹ An overview of the national economy and energy sector was then undertaken, including information on recent energy balances. Subsequently, a summary of energy related projects (completed and ongoing) was prepared through the assessment of social and commercial aspects related to energy efficiency and renewable energy and sources of financing. The process of financing was also evaluated, and finally, a list of the main institutions and their characteristics as sources for financing for new energy efficiency and renewable energy projects was elaborated.

¹ Information obtained from international sources, the Caribbean Community, the Organisation of Eastern Caribbean States, and the Government of Saint Lucia.

I. Introduction

This report focuses on the identification of mechanisms for financing of energy efficiency and renewable energy initiatives to increase investment in Saint Lucia, and is one of the main outputs of the GIZ/ECLAC project titled “Sustainable Energy in the Caribbean: Reducing the Carbon Footprint in the Caribbean through the Promotion of Energy Efficiency and the Use of Renewable Energy Technologies”. This specific objective of this project is to examine financing opportunities which Caribbean countries could exploit in order to better provide incentives for the development of energy efficiency measures and renewable energy technologies. Addressing this issue is critical for the energy security of Caribbean economies, given their high dependence on, and cost of importing fossil energy. They also need to reduce their carbon emissions in order to respond to the challenges of global climate change. While it is anticipated that project results will benefit all Caribbean countries, direct interventions were undertaken in three pilot countries these being Dominica, Saint Lucia and Martinique. The present report assesses the state of energy development in Saint Lucia, and reviews options that might be available to the country in financing the future implementation of renewable energy and energy efficiency in that country. The report is organized into four sections. Following the introduction in Section I, a profile of the energy sector is elaborated in Section II. Section III identifies financing opportunities for developing renewable energy and energy efficiency in the country, while conclusions on the assessment are drawn in section IV.

A. Background

Saint Lucia is an island in the Caribbean Sea and forms part of the eastern Caribbean section of the West Indies archipelago. As part of the Lesser Antilles, it is located north/northeast of the island of Saint Vincent, northwest of Barbados and south of Martinique. It covers a land area of 616 km² and has an estimated population of 173,765 (2009 Census).

Energy is critical to the functioning and growth of any society. Hence, access to affordable and reliable energy is necessary for all sectors of the Saint Lucian economy including services such as health, education, food and water security, and communication. As a result, the living standard and the levels of development and competitiveness of a country are all directly linked to its access to energy.

With the exception of Trinidad and Tobago, Caribbean islands depend almost exclusively on imported fossil fuels and their derivatives for energy. As one such country, Saint Lucia is therefore

very vulnerable to oil price increases and supply shortages. While the financial analysis of this report does not include all the impacts of the sharp decline in oil prices that took place in the second half of 2014, long term projections suggest that oil prices will remain lower than average prices seen in the recent decade. According to the World Bank (2015), average spot prices² for oil are anticipated to range from 49.7 USD/barrel in 2015 to 70.8 USD/barrel in 2025. Other analysts suggest that prices are not likely to regain the same levels of the first part of 2014, at least for the next 5 years. All this information should be considered in assessing the costs of renewable energy investments.

It is well known that the initial cost of investing in renewable energy technologies could be prohibitive so that there is a need to address ways to deploy them in order to reduce these costs to consumers. Additionally, Saint Lucia has important natural energy resource opportunities in the form of high geothermal potential, and to a lesser degree, wind and solar power.

This notwithstanding, Saint Lucia is the second largest oil importing country in the Organisation of Eastern Caribbean States (OECS), with around 3,000 barrels per day (World Watch Institute, 2013). This level of dependence leaves the island vulnerable to the volatility of international oil prices and results in a substantial drain of foreign exchange resources for imports. Such vulnerability is reflected in the impact of the global recession from 2008 to 2010, during which time, the increase in energy prices was accompanied by an increase in the cost of goods and services. And in spite of the recent declines in energy prices, Saint Lucia's high dependence on imported fuels, and its high cost in terms of share of GDP mean that small shifts in the global energy market have the potential to impose significant impacts on the society through increased costs of many goods and services. All of these dynamics serve to underscore the need for Saint Lucia to adopt sustainable energy strategies that will strongly promote renewable energy (RE) and energy efficiency (EE) across all sectors wherever feasible.

In addition, concerns from Caribbean governments about the serious impacts of climate change have prompted studies on reduction of greenhouse gas emissions and on potential energy savings through better use of available energy, i.e. greater energy efficiency. Related research has also been undertaken on the potential of renewable energies, which, ultimately, could contribute to a widespread decline of greenhouse gas emissions. Likewise, Caribbean islands are particularly vulnerable to the environmental impacts associated with fossil fuel consumption and its emissions, such as sea level rise, ocean acidification, ecosystems degradation, and coastal erosion, among others.

In responding to these challenges, Saint Lucia has made progress in the areas of strengthened legal and regulatory framework and the preparation of action plans. The National Energy Policy (NEP) was approved by the Cabinet of Saint Lucia in 2010, and the Sustainable Energy Plan (SEP) was updated in 2007 and is to be further updated again based on the approved NEP (OECS, 2014).

Studies on energy efficiency and renewable energy in the Caribbean have been supported by a range of institutions and governments.³ A large number of studies in Saint Lucia have also shown significant potential for geothermal energy, but the final stage of the research-development process has not yet been implemented. Indeed, the only renewable resource that is currently in use is solar

² World Bank based on Brent, Dubai, and WTI prices.

³ OAS, ECPA, CREDP-GIZ, UNIDO, WB, IDB, UK-DFID, Geocaraibes, C-SERMS of CARICOM, CDB, among others.

energy, used mainly for water heating. However, only 0.07 per cent of electricity is generated through photovoltaic solar cells.

ECLAC subregional headquarters for the Caribbean has led several studies on the impacts of climate change in the Caribbean, including impacts on the energy sector. Together with its headquarters in Santiago, ECLAC is now seeking to extend its support in the Caribbean by undertaking analyses for the financing of EE and RE initiatives, and mechanisms that could increase this type of investments in Caribbean region. The approach takes into account already identified challenges, such as lack of financial resources to develop, implement and monitor EE and RE programmes.

Financing to improve energy efficiency and to deploy the production of electricity from renewable energy is one of the most important initiatives for achieving energy security, especially given that domestic savings capacity is not adequate for addressing the problems of EE and RE.

B. Objectives, scope and methodology

The overall objective of this study is to examine financing opportunities which could provide greater incentives for the development of energy efficiency measures and the deployment of renewable energy technologies in Saint Lucia. The scope of this study is informed by a consideration of the relationships apparent in the following issues:

- All islands need to achieve an energy matrix that represents the highest possible level of energy security.
- Saint Lucia's energy sector depends on significant imports of petroleum products. The other components of the sector are formed by a few RE production sources.
- Taking into account the lack of proven oil and gas reserves, a sustainable and strategic approach to transform the energy sector is to deploy electricity generation from renewable sources in order to enhance energy security in the country.
- A decrease in the oil import bill in the present and immediate future can be achieved by implementing a set of measures that increase energy efficiency.
- These intentions for Saint Lucia are reflected in national policies and plans, and should have the necessary legal backing, political will and popular awareness so that actions are applied consistently to achieve continuous improvement of production processes and energy consumption. Barriers and constraints to the achievement of these goals should also be eliminated for the successful implementation of energy programs.
- The proposed actions and measures can be transformed into EE and RE projects, and such projects can form the basis for transforming the energy mix of the island. They should also take into account the projected demand and utilisation of domestic renewable resources.
- Secure financing of projects is achieved in several steps. The first step is to define domestic capacity (public and private) since regional savings and investment capacity is small. Hence the search for other financing sources to meet requirements is crucial.

The scope of this report addresses the above-mentioned aspects, taking into considering already implemented and ongoing projects. The methodological approach of this study involved undertaking the following steps:

- Conduct a literature review, mainly related with energy policies and plans (from CARICOM, OECS and Saint Lucia).
- Overview of the local economy and the local energy sector, including information on recent energy balances.
- Summary of energy projects (completed and ongoing) related to EE and RE and their respective sources of financing.
- Evaluation of the financing process.
- Elaboration of a list of available sources of financing for new EE and RE projects.

The draft of this report was presented to, and discussed with stakeholders in Saint Lucia in February, 2015. Subsequent to the presentation of the draft report, field visits were conducted with several national stakeholders in order to identify potential projects for the development of RE and EE initiatives.

II. The energy sector in Saint Lucia

A. National economy and energy sector

1. Update on national economy

The economic performance of Saint Lucia could be qualified as “fragile” since the economic crisis of 2008. In the most recent period, the island has had to grapple with a host of economic problems. The annual average growth of two of the main macroeconomic indicators, namely Gross Domestic Product (GDP) and external debt, demonstrates such performance (see table 1).

Table 1
Gross Domestic Product and external debt annual average growth
(Percentage)

	2000-2009 ^a	2010-2014 ^b
GDP annual average growth	3,2	-1,0
External debt annual average growth	9,3	7,6

Source: ^a International Monetary Fund (IMF), 2015; ^b Economic Commission for Latin America and the Caribbean (ECLAC), 2015.

Considering International Monetary Fund (IMF) and ECLAC statistics, the general outcome shows stagnation with a decline in Gross Domestic Product figures in 2010 and from 2012 through 2014.

A general overview of the main economic indicators for the last three years and perspectives for 2015 are shown in table 2.

Table 2
Main economic indicators
(Percentage)

	2010	2011	2012	2013	2014
GDP growth ^a (%)	-1	1.2	-1.6	-0.4	0.5
Current account balance/GDP ^a (%)	-20.3	-24.3	-14.0	-8.8	-8.9
Fiscal Deficit / GDP ^b (%)	-4.5	-4.6	-6.5	-6.7	-3.1
External debt ^b (US\$ m)	393	417	435	488	527
External debt/GDP ^b (%)	31	32	33	42	44

Source: ^a International Monetary Fund (IMF), 2015; ^b Economic Commission for Latin America and the Caribbean (ECLAC), 2015.

As a very small open economy, the sustained deficit reached -8.9 per cent of GDP in the current account balance in 2014. This deficit is forecasted to increase to -11 per cent in 2015, and would have amounted to more than US\$ 1 billion since 2009.

According to figures from ECLAC (2015), this deficit has pushed the country's external debt up to US\$ 488 million in 2013 and US\$ 527 million in 2014, which represented 42 per cent and 44 per cent of GDP in 2013 and 2014 respectively.

In addition, public debt reached US\$ 1,045 million in 2015, as a consequence of the fiscal deficit. This value represents 73.6 per cent of GDP in 2013, and in the first six months of 2014 grew again by 2.4 per cent, in comparison with the same period of 2013.

The economy of Saint Lucia currently relies primarily on tourism, which represents more than 65 per cent of GDP in recent years. Services in general are more than 77 per cent, with a 14 per cent growth rate in the last 5 years and visitor expenditure reaching US\$ 653 million in 2013. This sector grew by roughly 6 per cent in 2014.

The other main export of Saint Lucia is bananas, but production has declined 28.8 per cent in recent years due to the adverse impact of the Black Sigatoka disease, Hurricane Tomas and heavy rains.

According to ECLAC (2015), GDP is expected to further decline in 2015 by 0.2 per cent and a modest increase of 0.5 per cent could be expected in 2016. Nevertheless, other sources (IMF and WB) present more optimistic forecasts (see table 3).

Table 3
Gross domestic product growth from different sources, 2015
(Percentage)

Institution	2014	2015	2016
Economic Commission for Latin America and the Caribbean	-1,6	-0,2	0,5
International Monetary Fund	0,5	1,8	1,4
World Bank	1,0	4,0	3,8

Source: Author's compilation.

In any case, all forecasts present a better situation for the Saint Lucia economy in 2016. The International Monetary Fund forecasts also show that the economy is likely to register an overall better performance up until 2020 (see table 4), although the proportion of the current account deficit to GDP will increase significantly from around -9 per cent in the present year to -15 per cent by the end of 2020.

Table 4
Gross domestic product and current account balance forecast
(Percentage)

	2016	2017	2018	2019	2020
GDP growth	3.8	4.0	4.2	4.6	4.5
Current account balance/GDP	-13.9	-14.2	-14.9	-15.0	-15.0

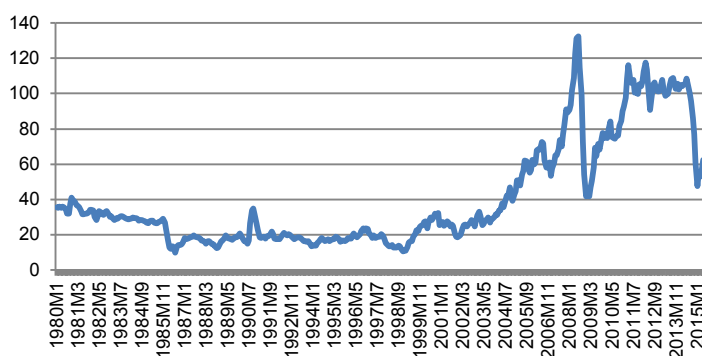
Source: International Monetary Fund (IMF), 2015.

The analysis of the forecasts presented suggests the need for the Government of Saint Lucia to act as a guarantor of loans and organiser of international cooperation in the process of financing energy efficiency improvements and renewable energy investments.

2. Profile of the energy sector

As noted above, like most Caribbean islands, Saint Lucia relies on oil imports to meet more than 95 per cent of its energy needs. The Saint Lucian Energy Supply Matrix depends on secondary sources, namely diesel oil (758 kBoe), electricity (239 kBoe), gasoline (322 kBoe), LPG (60 kBoe) and kerosene and jet fuel (17 kBoe) (OLADE, 2014). This suggests an import of around 3,000 barrels per day (ECLAC 2013a). This is a matter of concern given the instability in oil prices in recent years, as shown in Figure 1.

Figure 1
Historical crude oil average monthly price⁴
(USD/barrel)

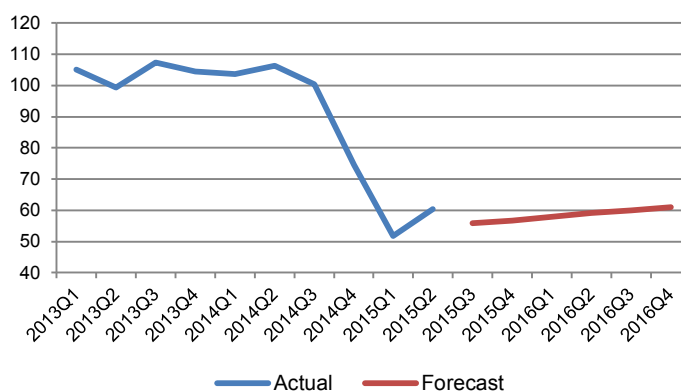


Source: International Monetary Fund (IMF), 2015.

⁴ Petroleum price is average of spot prices for U.K. Brent, Dubai and West Texas Intermediate.

Notwithstanding the recent decline in oil prices which could yield a more favourable economic scenario (see figure 2), the need for oil imports of more than 15 per cent of total imports, also presents an important obstacle to developing the necessary infrastructure and services for the tourism sector and for the whole economy in general.

Figure 2
Crude oil average quarterly price forecast⁵
(USD/barrel)



Source: International Monetary Fund (IMF), 2015.

Considering the electricity supply, Saint Lucia Electricity Services Limited (LUCELEC) has an installed capacity of about 86.2 MW (Rickerson, 2014). Saint Lucia's 2015 peak demand was 60.3 MW (NREL, 2015), with net generation of over 350 GWh. Demand forecast in 2025 is expected to be 102 MW. The average increase in demand per year is expected to be approximately 3.8 per cent. Generation forecast in 2015 is 415 GWh and 565 GWh in 2025. The average increase in generation per year is expected to be roughly 3.1 per cent (Nexant, 2010).

Even though LUCELEC has installed modern metering infrastructure in 20 per cent of its customer base, and system losses have been reduced since 2010, they still remain high at 9.3 per cent (NREL, 2015).

With respect to final energy consumption, the main sources are electricity, gasoline and diesel oil with the commercial sector absorbing 49.2 per cent, while residences use 29.7 per cent and industries 5.2 per cent (NREL, 2015). Electricity grid access is over 96 per cent.

Saint Lucia is one of the SIDS that has a monopoly in electricity generation, transmission and distribution. LUCELEC has the exclusive license to work on electricity issues until 2045. The Electricity Supply Act of 1994 (amended in 1996, 2001 and 2006) provides this license. This Act includes neither regulations for independent power producers, nor for the deployment of renewable energy sources to generate electricity, since Saint Lucia does not currently have an independent electricity regulatory body. However, soon a national utility regulatory commission should be put in

⁵ Petroleum price is average of spot prices for U.K. Brent, Dubai and West Texas Intermediate.

place under the recently approved National Utilities Regulatory Commission Act No. 3 of 2016.⁶ Saint Lucia also does not have a substantial fleet of existing renewable energy generators, since as of 2013 only approximately 61 kW of small-scale PV had been installed (Samuel, 2013).

With regards to pricing, electricity tariffs include a component which covers the power utility operating costs and a fuel surcharge, related to the cost of imported fuel. In Saint Lucia the average rate in 2015, including the fuel surcharge, was US\$ 0.34/kWh for domestic consumers, and US\$ 0.47/kWh for commercial consumers and hotels (NREL, 2015). The Global Competitiveness Report (WEF, 2013) identifies the quality of electricity supply and the price of electricity as important contributors to economic growth. Even though Saint Lucia's rates are below the Caribbean average of US\$ 0.33/kWh, the high price of electricity reduces the competitiveness of the economy, as they remain three times higher than tariffs in developed countries like the United States. Within this context, low competitiveness may be offset by improving the overall level of energy efficiency in the economy.

Although the actual renewable energy potential of Saint Lucia has not yet been fully quantified and the country has failed to meet its target of 5 per cent renewable electricity by 2013, the Government of Saint Lucia is keen to increase the share of electricity generation from renewables to 15 per cent by 2015 and 30 per cent by 2020 (REEEP 2014). Recently, this target was revised to 35 per cent by 2020⁷, and is expected to be achieved with the revision of the Power Supply Regulation. The proposed amendments will make LUCELEC responsible for ensuring that this quota is achieved, either through its own generation or purchasing of renewable electricity from adequate generation facilities. Having been identified as a national economic priority, this goal is considered feasible given the country's potential in solar, wind and geothermal sources (Ephraim (2009), Nexant (2010), NREL (2015) and Rickerson (2014) (see table 5).

Table 5
Renewable energy status and potential

Source	Potential	Installed capacity
Wind	40 MW	0
Hydropower	0.15 MW	0
Geothermal	170 MW	0
Ocean	Unknown	0
Biomass	Unknown	0
Solar	36MW	0.1

Source: National Renewable Energy Laboratory (NREL), 2015.

⁶ Review of legislation and institutional mechanisms for the setup of the National Utility Regulatory Commission were undertaken during the first quarter of 2016.

⁷ Creating Climate Wealth Summit in the British Virgin Islands (2014)

B. Energy related projects and studies

For a better understanding of the scope of previous studies undertaken for the Government of Saint Lucia (GoSL), the projects have been classified according to their objectives and focus, and whether they analysed social or commercial aspects of energy.

The first group focuses on study projects and refers to research and development issues, legal and policy framework, and energy quality matters at the regional, sub-regional and national levels. The second group, social projects, consists of projects that assess direct benefits to the population, inter alia, the substitution of incandescent bulbs by CFL or LED lighting, as well as training programmes and awareness campaigns. The third group of commercial projects brought together several productive initiatives, such as deployment of new utilities and renewable energy plants, and actions to improve energy efficiency and energy conservation.

Based on the authors' compilation, twenty-nine projects have been conducted in Saint Lucia,⁸ which show significant potential of the island's renewable energy deployment and the possibility of implementing energy efficiency and energy conservation measures. Table 6 shows a summary of energy efficiency and renewable energy projects implemented in Saint Lucia and the main financing agencies. Further details are presented in annex 1.

Table 6
Summary of energy efficiency and renewable energy projects implemented in Saint Lucia
Main agencies of financing

Classification	Theme	Financing agency	Total
Study	Geothermal, waste to energy, biomass, wind, EE initiatives and policies	GoSL, GSEII, OAS, EU, CREDP-GIZ, UNEP, Government of Taiwan	15
Social	EE incentives and replacing of incandescent bulbs	GoSL, CREDP-GIZ, UNIDO, CPEC, CIDA, Government of Cuba	8
Commercial	Oil, solar PV, solar water heating	GoSL, WB, OAS, UNIDO, GSEII, Governments of New Zealand and Venezuela	6

Source: Author's compilation.

Five studies on geothermal and biomass have been done with an estimated cost of over US\$ 37 million.⁹ These power options have significant potential, but have so far not been developed to commercial scale. The only renewable resource that is currently in use is solar energy, mostly for heating water, and only 0.07 per cent of the total electricity is generated using photovoltaic solar cells.

⁸ National Energy Policy (NEP), Caribbean Information Platform on Renewable Energy (CIPORE) web site and Ministry of Sustainable Development, Energy, Science and Technology corrections from Ephraim, J. and Joseph, B (February 2015).

⁹ Data from CIPORE 2014.

The following sections present a review of policies, legal issues and barriers, as well as details about results of projects and studies on energy efficiency, energy conservation and renewable energies.

1. Projects on policies, legal issues and barriers

The GoSL and the Ministry of Sustainable Development, Energy, Science and Technology are aware of the importance of measures to ensure an efficient use of energy and the advantages of renewable energy sources. As a consequence, a Sustainable Energy Plan (SEP) was developed under the Global Sustainable Energy Islands Initiative (GSEII) in 2001 and updated in 2007. Subsequently, the Cabinet approved the National Energy Policy (NEP) in June 2010, which was developed with assistance from the Organisation of American States (OAS) and support from Caribbean Renewable Energy Development Programme (CREDP/GIZ).

A Sustainable Energy Strategy (SES) was also developed in June 2010 with the support of the European Union. It included the development of a strategy for the liberalisation of the electricity sector, the promotion of the development of both large-scale and small-scale renewable energy projects and the promotion of EE with a focus on the transport, hotel, commercial and public sectors of the economy of Saint Lucia. The strategic options for EE and energy conservation measures in Saint Lucia target the following: 1) transportation sector, 2) buildings, 3) demand side management programmes, 4) lighting measures, 5) domestic water heating (SWH), and 6) air conditioning measures (ECONOLER 2014).

Since 2013, Saint Lucia has been a member of the Eastern Caribbean Energy Regulatory Authority (ECERA), a development that has enabled independent regulation for the uptake of renewable energy technologies, especially by setting economically viable tariffs for the stakeholders involved. The participation in ECERA also calls for the revision of the Electricity Supply Act so as to remove the current barriers to the development of renewable energy.

This revision is already being undertaken and is expected to be completed by the end of 2015.

One important issue that LUCELEC will face once the Regulatory Commission is operational will be assessing the Power Purchase Agreements (PPA) of companies that wish to sell renewable electricity to the company (LUCELEC 2013). Moreover, given the changing environment in which LUCELEC would operate, one of its key strategies is diversification. The company is planning to do this through the establishment of a Subsidiary Holding Company (SHC). According to its last annual report, preliminary analyses and studies are being conducted to identify which business cases offer the best prospects for success.

Box 1 National Energy Policy at a glance

- Liberalisation of the energy sector
- Broad private sector participation
- Energy security and reliability
- Diversification of the energy base
- Exploitation of indigenous renewable energy sources
- Higher efficiency throughout the process
- Reduction of adverse environmental effects
- Implementation of appropriate pricing policies
- Establishment of an Energy Policy Advisory Committee
- Establishment of a Regulatory Commission for the sector
- Development of long-term Power Expansion Plans (every 4 years, revised every 2 years)
- Overall targets for renewable energy generation:
 - 2015: 15 per cent
 - 2020: 35 per cent

Finally, Saint Lucia's institutions recognise the need for training in topics such as: energy forecasting, demand drivers, project evaluation, project management, and calculation of initial investment capital, among others.

2. Projects on energy efficiency and renewable energy

Energy efficiency and conservation are short-term measures that could help to reduce the nation's use of fossil fuels and the related negative environmental impacts. Its analysis should be focused on both the demand and supply sides. As in other Caribbean states, technologies installed in public buildings are old and inefficient, and the potential for energy savings is high with a quick payback.

A series of energy efficiency initiatives have been supported in the Caribbean region, particularly in Saint Lucia. The OECS Institutional Energy Efficiency Program in Saint Lucia aims to achieve overall electricity savings of 11.5 GWh/year, with 6.1 GWh/year coming from institutional buildings and 5.4 GWh/year from street lighting. Investment for these initiatives, without considering the development programme and operating costs, is estimated at near US\$ 11 million (ECONOLER 2014). Targets and investments for Saint Lucia are the highest in this Caribbean programme.

Both residential and commercial customers have been making investments in energy efficient lighting, primarily in CFLs and in LEDs. In addition, the Ministry of Sustainable Development, Energy, Science and Technology conducted a Pilot LED Street Lighting Project funded by OAS. Under the first phase of the project, 48 LED street lights were used to replace the 250W High Pressure Sodium lights currently being used. A street lighting paper for the island was recently prepared for endorsement by the country's cabinet.¹⁰

The GoSL also continues to build consumer awareness with regards to energy conservation and efficiency. For example, under the EU 2006 Energy Programme, the Government developed an energy efficiency guide entitled "Save Energy Costs – A Guide" (GoSL, 2010). This guide provides easy and simple tips to reduce energy consumption. CREDP/GIZ has also been supporting Caribbean projects on EE promotion, and examples for Saint Lucia are:

- Conducting energy audits in hotels
- Conducting a workshop for architects, builders and students of the relevant subjects in energy efficient building design
- CREDP-GIZ/OECD launched the Eastern Caribbean Energy Labelling Project (ECEL) in April 2012. The project aimed to assist in the removal of barriers for the rapid and widespread use of energy-efficient domestic appliances in low-income households, as well as in the service sector in the OECS member countries, and to develop or adapt EE standards and labelling schemes and—where necessary—quality norms for selected electrical appliances and equipment.

A relevant initiative for raising awareness among Saint Lucians is the annual Energy Awareness Week. This model, which was later used in the design of CARICOM Energy Awareness

¹⁰ ECLAC, 2014.

Week, is intended to educate and make the participant country's population aware of issues related to energy as well as ways for enhancing sustainable energy use.

In terms of incentives for EE and RE, in May 1999, the GoSL passed Cabinet Resolution No.464 eliminating all import duties and consumption taxes on renewable energy equipment and materials. Further, in April 2001, the Government decided to make the purchase of solar water heaters tax-deductible. Additionally, an environmental levy was applied to the importation of used vehicles, thereby incentivising the acquisition of new ones.

Programmes at both the subregional and national levels have also been developed for OECS countries. They can be summarised as follows (ECONOLER, 2014):

- The Direct Install Programme focuses on the private sector, which includes residential, commercial (mainly hotels in the case of Saint Lucia) and industrial sub-sectors, and involves direct installation of EE technologies for lighting, air-conditioning and domestic water heating (solar water heaters).
- The Institutional Energy Efficiency Programme targets the public sector's institutional buildings, street lighting and water and wastewater infrastructure. The programme takes a holistic approach by offering energy audits and comprehensive EE projects, but with a focus mainly on lighting and air-conditioning end uses.

The above programmes will be developed and managed at the sub-regional level, but implemented at the national level in collaboration with LUCELEC and the Ministry of Finance, Economic Affairs, Planning and Social Security. Some actions would also be undertaken at the national level to ensure their complete implementation.

With respect to renewable energy technologies (RET), cost, performance, and reliability have improved significantly over the past few years thus making them more competitive in a range of applications today. The momentum for renewable energy worldwide is strong, and the prospects for these technologies remain unexploited.

Saint Lucia has participated in a number of renewable energy initiatives regionally. For example, the country has been involved in the Eastern Caribbean Geothermal Development Project (Geocaraibes) funded by the Organisation of American States. This project addressed the development of geothermal energy on the islands of Dominica, Saint Lucia and St. Kitts and Nevis, and sought to reduce the risk-costs linked to geothermal utilisation and to create the conditions for its commercial development in the region. The country is part of the Global Sustainable Energy Island Initiative (GSEII), a consortium of international non-governmental organisations and multi-lateral institutions that supports small island states and potential donors by bringing RE and EE projects together.

Alternative power sources such as geothermal, waste-to-energy (WTE) and biomass have been extensively studied in Saint Lucia. Unfortunately, no commercial application of these sources has been implemented to date. Negotiations relating to drilling in the area of the Sulphur Springs and surrounding areas where geothermal energy is highly promising were placed on hold for several years, until in 2010 when Qualibou Energy announced that it had signed an agreement with the government to begin drilling and developing as much as 170 MW of geothermal energy. However, that same year Nexant reported that the fluids were too corrosive for pursuing this project.

More recently, LUCELEC indicated that it was working with the Government in developing a request for proposals for renewable energy projects and is pushing towards exploration of the geothermal potential in Soufrière (LUCELEC's annual report 2013). According to the report, these

efforts were expected to generate results in 2014. In addition, another project with the collaboration of the World Bank and the government of New Zealand has started with the objectives of assessing the geothermal potential of the island and developing a geothermal plant based on the assessed potential.

At the same time, three studies on WTE and biomass energy sources were conducted. Two were undertaken by GSEII: 1) the Cicerone Landfill gas to energy project, and 2) the poultry litter to energy project. Upon conclusion of the pre-feasibility studies, both projects were cancelled. The third project was a waste banana to ethanol project, winner of the 2009 IDEAS Energy Innovation Contest for Latin America and the Caribbean. This initiative was sponsored by the Inter-American Development Bank (IDB), GTZ and the Korean Government, with a funding of US\$ 198,000.

In yet another recent study, wind was considered to be the most promising renewable resource for Saint Lucia (ECONOLER 2014). LUCELEC has identified a site for a wind farm and has sought the assistance of the GoSL in acquiring the land, which has been a major challenge for the implementation of wind energy. According to CIPORE, in 2009 the GoSL agreed to acquire 210 acres of land at La Sikwi Sugar Mill for the development of a 12.6 MW wind farm. Furthermore, LUCELEC, working with a Canadian partner, The Probyn Group (owner, operator and financier of independent power facilities), have completed feasibility assessments for the site on the island's north-east coast. LUCELEC has also collaborated with the private developer Wind Tex for the development of a 12 MW wind farm on the east coast. At present a test tower has been installed on site for the feasibility study and data collection.

As mentioned before, solar energy is the only renewable resource that is currently in use in Saint Lucia, and is used mainly for water heating and power generation. Even though Saint Lucia's global horizontal irradiation per square meter per day is 5.7 kWh (NREL, 2015), solar energy represents less than 0.1 per cent of the national electricity generation. As a result, solar energy can be used for electricity generation and heating, and the latter holds much scope for use in both the domestic and the hotel sectors.

LUCELEC started with a 4 kW solar energy generation at the Cul De Sac power plant and aimed to increase this up to 75 kW by 2015 (LUCELEC 2014).

In terms of hydropower, although the majority of the rivers in Saint Lucia are quite small, there is some potential for mini hydropower applications, such as those that can be used in the agricultural sector. Preliminary research has also suggested that the Roseau dam could be used to produce electricity. A study completed by CREDP-GIZ has identified potential for a 160 kW hydropower plant. Currently, only one small Turgo hydropower plant of 240 W is operational, installed by the University of Vermont at the estates at Latille Falls, close to the Mondesir Estate. At present this facility is not in operation as it requires minor repairs after the damage caused by Hurricane Tomas. Another small hydropower plant in its vicinity is currently not operational. No other hydropower plants are in operation to date.¹¹

¹¹ World Small Hydropower Development Report, 2013.

III. Financing opportunities for energy projects

A. Lessons learned

For the purpose of this report, the authors classified projects into three groups, inter alia, 1) “study projects” (including projects on: research and development, policies, acts, regulations and barriers); 2) “social projects” (capacity building, training and public awareness); and 3) “commercial projects” (for businesses). The twenty nine projects reviewed (see annex 1) showed some trends that have a direct relationship with the researching of finance agencies for the development of energy efficiency and renewable energy projects.

Firstly, according to this classification, 51.7 per cent of the projects are studies, 27.6 per cent are of social type and the remainder 21.7 per cent are commercial projects. This suggests that Saint Lucia may need to increase the conversion of the finalised studies into productive applied projects.

Secondly, Saint Lucia’s estimated geothermal energy potential ranges between 170 and 680 MW (World Watch, 2013). Studies and related research have been done for more than 30 years with a cost of about US\$ 30 million but without any evidence of tangible progress in this area. It should be noted that studies on geothermal energy use have been difficult, mainly due to the high complexity of the technology involved. However, a recent study by ECONOLER notes that wind is the most promising renewable resource for Saint Lucia (ECONOLER, 2014). Taking into account the current status of all studies, the Government of Saint Lucia is emphasising and aggressively pursuing the deployment of renewable energy resources such as wind power and solar power, as well as the completion of geothermal studies and other related projects.

Thirdly, regarding energy efficiency, Saint Lucia has implemented several actions, such as changing incandescent light bulbs to CFL bulbs; removal of import duties for renewable energy equipment, and the introduction of an Energy Awareness Week to promote public awareness. Another project which aimed to make solar water heating systems affordable and available on the general market, as of 2009, has had little progress (CIPORE, 2014). Finally, a pilot project on retrofitting of street lighting was recently conducted and results are currently being reviewed (ECLAC, 2014).

In spite of these efforts, it is apparent that some proposed energy efficiency projects were not subsequently implemented. Among these were projects proposed for retrofitting of electronic equipment, improving public transport, and reducing the exposure of public buildings to the direct impacts of the sun. Nevertheless, it is necessary to highlight that the GoSL is currently conducting studies for the applicability of electric mobility, and a transport policy is being drafted as well.

A fourth trend observed from the review of past projects in Saint Lucia is that over the last ten years,¹² at the regional, subregional and national levels, such projects persistently show the same deficiencies, barriers and obstacles for successful deployment of energy efficiency and renewable energy initiatives. Some examples are:

- Human resources limitations (qualification and availability).
- Low public awareness in regards to energy saving measures.
- Insufficient interest on energy efficiency and renewable energy from both the public and the private sectors.
- High cost of more efficient equipment and high initial investments for renewable energy production.
- Lack of cohesive regulations and policies to promote trust among private investors (foreign investment act, mutual agreements for foreign investments protection, agreements to avoid a double fiscal imposition and measures to promote investments in EE and RE).
- Deficient availability and transparency of statistical information on the energy sector.
- High transaction costs and limited fiscal incentives for the purchase of energy efficient equipment.
- Lack of access to credit for energy efficient and renewable energy technologies
- High user discount rates.
- Higher perceived risks of the more-efficient technologies.

Based on these observations, it is proposed that future development projects in this area should include strategies for technical involvement of local personnel (both civil servants and private sector technicians) in order to further develop local capacity in RE and EE.

The issue of funding was also observed as an important constraint considering the low economic capacity of SIDS to raise the necessary resources for their energy development. In this regard, financial barriers could be overcome through appropriate use of international funding sources, as will be explained later. These are applicable to commercial projects as well as household investments. Moreover, CARICOM is cognisant of the necessity of exploring and establishing a feasible institutional framework to support financial mechanisms for the development of viable energy resources. This is noted as one of the CARICOM's energy policy goals.

Finally, as observed from the project review and highlighted by Fichtner (2012), another factor which could affect decision-making for the development of alternative energy in Saint Lucia, is

¹² Ephraim (2009), NREL-OAS (2012), CARICOM (2013), OECS (2014) & ECONOLER (2014).

the absence of well-structured projects.¹³ For this reason, the following section is dedicated to highlighting the process of energy financing.

B. Process of financing

One of the most direct ways to increase national economic efficiency in the Caribbean countries finance energy programmes which seek to reduce energy costs. This is important even in light of the recent dramatic decline in global oil prices, since energy is largely unaffordable for many small economies, and price volatility has a major impact on production costs.

There are two main ways of increasing energy efficiency and achieving sustainable energy development. One is reducing the input costs of electricity through the use of more efficient equipment, thus also reducing fossil fuel consumption. The other is to generate electricity by substituting the traditional use of fossil fuels with renewable sources.

Financing these projects is complex due to high upfront investments and capital costs of the technologies. Therefore, all stakeholders involved in this process are often concerned with the associated risks relative to the expected results. In this regard, one of the foremost issues in financing energy projects is to gain a better understanding of the process itself.

The process of financing energy related projects could be classified according to a number of key variables. First of all, however, it is necessary to identify the main actors and factors in this process with these being the following:

- Energy balance forecast and goals of the financing
- Identification of donors, funders and sponsors
- Presence of intermediation entities
- Work on financing lines of entities that offer financing
- Existence of appeals
- Document formalities

An energy balance forecast will allow for the determination of the amount of energy (electricity, for instance) that the country will need in, at least, the next 20-30 years. Then, the purpose or objective of the financing must be clear in all cases, that is, whether it is a study, a social or a commercial project. Studies rarely need financial evaluation, while social projects are often presented along with a cost-benefit analysis. Commercial projects, on the other hand, call for a rigorous technical, economic and financial evaluation. Saint Lucian stakeholders such as LUCELEC and the Ministry of Finance, Economic Affairs, Planning and Social Security are in agreement about the need for a new national energy audit in order to better understand the current drivers affecting energy consumption. They also acknowledge the importance of conducting a national energy demand study, as a basis for projecting future energy demand in the island.

¹³ CREF, Barbados October 2011: “Financing is not a problem: funds are available. Well-structured projects are missing.”

The identification of financing sources must also be detailed. In this regard, project managers should take into consideration the various types of funding institutions these being:

- Government donors or sponsors: Funds are offered for specific projects. Funds are offered as donations or subsidies, and are generally for the conduct of studies. Philanthropic institutions also provide funding and act similar to government donors. National or international financial institutions offer loans directly or indirectly (through national or local institutions).
- Other institutions act as intermediation entities, channelling funds from global or international institutions.

Funds can have one or multiple sources, and the end users can be locals within a country, or even the region itself. The latter are usually specific multilateral programs.

Intermediation entities: many projects are conceived from national initiatives, while others evolve as part of multilateral regional programmes. In any case, there are several institutions, which have been grouped under the name of Sustainable Energy Initiative Organisations (SEIOs). Among the international SEIOs are:

- The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future, and serves as the main platform for international cooperation, a centre of excellence, and a repository of policy, technology, resources and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bio- energy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity.¹⁴
- The Renewable Energy and Energy Efficiency Partnership (REEEP) is an international non-profit organisation that advances markets for clean energy in developing countries. The organisation builds scale and replication by connecting funding to projects, practice to knowledge, and knowledge to policy. The organisation uses donor funding to support a portfolio of high potential ventures that create energy access and combat climate change, often attracting private finance. REEEP monitors and evaluates projects within their policy, financial and commercial environments to gain insight into opportunities and barriers; subsequently this knowledge is fed into the project, the portfolio and the policy framework to continuously advance markets for clean energy.¹⁵
- The Global Sustainable Energy Islands Initiative (GSEII) was formed in 2000 to accelerate the transition of member states of the Alliance of Small States (AOSIS) toward cleaner, more sustainable energy use. The GSEII is a consortium comprised of NGOs and multilateral institutions which hold a common idea and goal for SIDS. Formally, the consortium is coordinated by the Climate Institute (CI) and is partnered with the United Nations Industrial Development Organisation (UNIDO). GSEII's strength is in the foundation of the consortium, as major partners can proceed with projects while others may struggle – ensuring a constant presence on the islands.¹⁶

¹⁴ From www.irena.org

¹⁵ From <http://www.reeep.org>

¹⁶ From <http://gseii.org/who-we-are/about-us>

As examples in the Caribbean region, the following should be mentioned:

- SIDS DOCK-5Cs-SPREP has been developed jointly by the Caribbean Community Climate Change Centre (5Cs) and the Secretariat of the Pacific Regional Environment Programme (SPREP). This initiative among member countries of the Alliance of Small Island States offers Small Island Developing States a collective institutional assistance mechanism to help them proceed on a sustainable economic development path and help generate financial resources for addressing climate change adaptation inter alia. Under SIDS DOCK, public–private partnerships will be promoted as a means for investments in sustainable energy projects and technology transfers.¹⁷
- The Caribbean Sustainable Energy Roadmap and Strategy (C-SERMS) is conceptualised as an updateable sustainable energy planning, management and implementation framework as well as a communication tool to be developed under the CARICOM Energy Programme in collaboration with CARICOM member states and other partners. Through C-SERMS, regional level sustainable energy targets and strategies for the short, medium and long term horizons will be established. The approach to developing the C-SERMS is to baseline energy efficiency opportunities and renewable energy resource potential. The development of C-SERMS will be guided by a broad-based stakeholder platform that will utilise appropriate tools to scan, monitor, analyse, track, plan and make adjustments to the set targets and strategies as required.

These organisations offer (or help to channel) financing for energy projects, and often work together with one or several of the institutions of the United Nations system (UNDP, UNIDO, UNEP, FAO, ECLAC, and others).

SEIOs and UN institutions play the role of coordination, technical assistance and process management in project funding, along with the necessary confirmation of results.

Priorities of financing institutions: it is crucial to be aware of the main lines of work and/or funding priorities, as well as the geographical or other social or economic purposes of each institution, so that the right project can be sent to the right funding institution. For example, in 2013-2014 REEEP prioritised the following lines of work:

- The Water-Energy-Food Nexus
- Sustainable Urban Transport
- Energy efficient buildings

Calls for projects: the bidder lenders (funding institutions) often issue calls for projects which are consistent with the priorities to which their funding will be assigned. These calls for projects include a particular procedure to be followed by every candidate project in order to win the bid. Some examples of these include IDEAS, organised by the Department for International Development (DFID) of United Kingdom for innovative ideas that promote renewable energy as well as the Abu Dhabi Fund for Development (ADFD) contest that was presented jointly with IRENA to promote energy access or address energy security.

Prerequisites: project planners must be aware that funding institutions have set preconditions for the release funds for any particular project. For example, to access funds coming from private

¹⁷ From: <http://aosis.info/sids-dock/>

institutions and occasionally from multilateral programmes, national government participation is often required. In this regard the following should be considered:

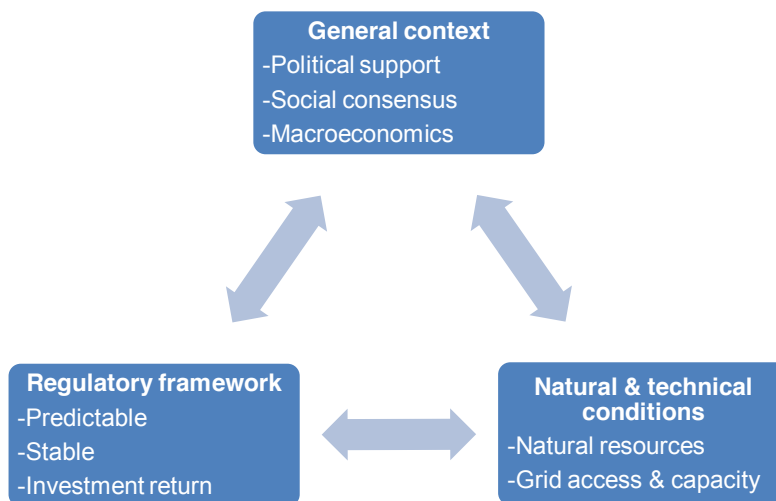
- The need for a financial entity at the national level, that could coordinate government and private sector interests and support the indispensable guaranties to be submitted to the creditors.
- The issue of guaranties by government or private sector bonds, to assure the reimbursement of the loans.
- The co-financing arrangements between government and private sector.
- The need to get the more non-profit related conditions (such as grants and international aid). The issue of the conditionality for financing is such, that in the case of Saint Lucia, it was difficult to attain the minimum conditionality for securing project financing given its status as a middle income developing state.

The necessary steps for the financing process for each type of project (studies, social or commercial projects) are sketched in annex 2.

While SEIOs and UN institutions can act as intermediates or even as funders, a study project is generally financed through government funds. The main financial sources for social projects are also governments and development agencies, although philanthropies often participate in these types of projects as well.

Regarding commercial projects, as in other economic sectors, projects could be financed by loans provided to private, public or mixed companies. There is available funding at lower interest rates and spread over longer terms. One of the possibilities of financing is the formation of a project company specifically to oversee the project such as for instance the deployment of an energy efficiency solution. In any case, it is a very complex process that involves stakeholders in analyses such as shown in figure 3.

Figure 3
Investment drivers



Source: Carlie Renewable Energy Forum 2012. Financing RE in the Caribbean, EIB's model and experience. [on line], <http://www.eib.org> [date of reference: 12 October 2014].

Additionally, there are concerns regarding conditions that could slow down the implementation of an energy project. Among these, Fichtner (2012), ECONOLER (2014) and OECS (2014) identify the main ones to be:

- Limited domestic resources (capital, skilled labour, raw materials)
- Reliance on imported capital and other resources
- Concerns about safety, productivity, and profitability of imported resources
- Concerns about general business environment (legislative, regulatory systems, labour unions)
- Shortage of infrastructure services
- Perceptions about the country in the international community
- Perceptions about lending to developing countries
- Concerns about transferring back returns on investment
- Concerns about political risk and foreign exchange convertibility
- Perceived risks in financing the project
- Complex financing arrangements involving many parties and many instruments

The financing process could include direct lending, indirect lending or on-lending (using commercial national banks) and insurance and guarantee.

The ultimate goal or objective of implementing EE and RE initiatives could be achieved by the design of several related projects: exploration and explanatory studies, pilot tests, or implementation of results in a commercial way. An example of these could be applied to the process to develop geothermal energy in Saint Lucia.

This complexity in the preparation of projects justifies the assembly of task groups within the appropriate institutions to support the procurement of financing, whether they are for small independent power producers (IPP) or national programmes.

C. Main sources for project financing

As has been shown, the process of obtaining funding for RE and EE projects depends heavily on the type of project. These factors are shown in table 7.

Table 7
Summary of relationships in RE-EE projects funding

Purpose	Donors/funders/sponsors	Intermediary	End-user
Studies	Mainly UN System, government development agencies and philanthropic institutions	UN System and/or SEIO	Mainly government
Social development	Mainly UN System, government development agencies and philanthropic institutions	UN System and/or SEIO	Mainly government and population, directly
Commercial	Multilateral and commercial banks	SEIO (occasionally)	Private sector

Source: information retrieved from each institution's website.

1. Multilateral funds¹⁸

The Global Environment Fund (GEF) of the World Bank (WB) is the largest source of public sector financing to support renewable technologies and practices and new and emerging energy in the developing world. In its first 18 years, the fund has provided US\$ 1.1 billion for these types of projects to private enterprises through the market. It is worth noting that 21 per cent of these funds were devoted to Caribbean countries.

GEF has provided support to developing countries and transition economies to support regulation of renewable energy generation. Meanwhile, it has continued to develop and strengthen local capacity to adopt, finance, install, operate and maintain RET. Investments in promising RET, both pre-commercial and commercial, have been a key element of GEF strategy. Over the past 18 years, GEF has supported the transfer of more than 20 RET to the developing world.

In June 2009 the renewable energy component of GEF Climate Change Project Portfolio amounted to US \$ 1.1 billion, with co-financing amounting to US \$8.3 billion.

It is estimated that activities concerning RET supported by GEF to date will result in the direct avoidance of at least 290 million tons of carbon dioxide (CO₂). On average, the GEF invests US\$ 3.97 per ton of CO₂ emissions avoided.

In the near future, the GEF will focus its support on renewable energy in the following areas:

- Creating favourable markets for renewable energy: GEF intervention under this objective will be a combination of technical assistance to support policy and regulation, strengthening technical and institutional capacity and creating financial mechanisms for investment in the use and dissemination of Energy Sustainable Technologies (ESTs).
- Investments in transferring RET: GEF will increase its investment in the transfer of ESTs commercially proven and will emphasise market demonstration and commercialisation of promising new technologies. It will also intensify its efforts to promote the next stage of intervention with regard to successfully demonstrated technologies in order to remove barriers to commercialisation and reduce costs over time.
- Promoting access to modern energy services: Given the huge demand for energy access and services in rural areas of developing countries, GEF will also support decentralised electricity production and heating from indigenous renewable sources. GEF has markedly increased their investments, especially in Sub-Saharan Africa, South Asia and Small Island Developing States, where most people, especially in rural areas, have no access to electricity and must use traditional biomass and imported fossil fuels to meet their basic energy needs.

The Global Energy Efficiency and Renewable Energy Fund (GEEREF) is the most important financing mechanism among European Union countries. According to GEEREF, “funds are invested in emerging markets and priority is given to countries with appropriate frameworks on energy efficiency and renewable energy, where high quality renewable energy resources and steadily reducing technology costs create compelling investment opportunities.”

¹⁸ Information regarding funds and programmes was retrieved from each institution’s website.

GEEREF's investments seek to provide benefits to:

- People: provide access to sustainable energy and increase energy efficiency in developing countries and economies in transition.
- Planet: fight climate change and contribute to a sustainable environment.
- Profit: achieve robust financial returns.

The fund invests exclusively on projects in emerging markets that qualify as recipients for Official Development Assistance; Saint Lucia is part of the 146 countries registered by the Organisation for Economic Co-operation and Development.

Regarding the technological scope of projects, GEEREF invests in specialist funds, developing small to medium-sized initiatives in the following sectors:

- Renewable energy, including small hydro, solar, wind, biomass and geothermal.
- Energy efficiency, including waste heat recovery, energy management in buildings, co-generation of heat and power, energy storage and smart grids.

GEEREF engages with funds early in their development and seeks to enhance strategy, team capability and structure, being often the first cornerstone investor in a fund. Underpinning GEEREF's investment strategy is a fundamental commitment to financial, environmental and social sustainability. GEEREF funds typically have:

- Strong technical and private equity transaction skills
- A regional focus, an established local presence and networks to generate deal-flow
- An overall size of between € 50 and € 200 million.

GEEREF has two portfolios dedicated to the Latin America and Caribbean region. These are the Emerging Energy Latin America Fund II and the MGM Sustainable Energy Fund (MSEF). The former targets high growth economies, while the latter has a broader scope that could benefit the Caribbean subregion. MSEF invests in projects in the demand-side energy efficiency and renewable energy sectors, specifically 70 per cent in energy efficiency and 30 per cent in renewable energy. GEEREF has committed € 10 million to MSEF.

The European Investment Bank (EIB) is the most important bank in the framework of the European Union for supporting energy and environment programmes. Approximately 90 per cent of the funds are attributed to promoters in member states of the European Union, however the bank also supports external partner countries. Caribbean countries can benefit from projects within the Sub-Saharan Africa, Caribbean and Pacific & Overseas Countries and Territories portfolio. In 2014, lending to this group showed approvals for € 971 million and disbursements for € 622 million.

The bank has guidelines that define the "Energy Lending Criteria", with emphasis on energy efficiency and renewable energy projects, including heating and cooling and large hydro. In addition, investments in renewables have also been grouped into mature renewables and emerging renewables, expanding investment opportunities since the bank also finances technologies that are expected to become competitive in a particular timeframe. As regards energy efficiency, transportation could benefit from the bank's approach. However, high subsidies and weak institutions are the two main obstacles for this type of investments. Therefore, investments include overcoming barriers and supporting sectoral policies in buildings, transport and industry.

The loan receiver can pay, as part of a plan of appropriate funding, up to 50 per cent of the cost of a project (usually less) in conjunction with the resources of the promoter and funds from other sources. The EIB acts as a lever or catalyst for attracting other sources of financing and co-financing from banks and other credit institutions (public and private), in particular those of the EU members, international financial institutions and regional development agencies. Most loans under the ALA III mandate are between € 20 and € 50 million. Payments can be made in one currency or a combination of currencies according to the recipient's preferences and the availability of cash. Whenever it is feasible, the EIB raises funds in domestic capital markets for its lending in the currency, thus relieving its customers of the risks of exchange.

EIB interest rates conform closely to the cost of their borrowing in capital markets. Loans are generally fixed rate, which is applied either on the date of signing of the contract or more often on the date of each disbursement (open-ended contract). Loans may also be granted under variable, revisable or convertible interest rates.

Regarding repayment, EIB lends to medium and long term projects whose maturity will depend on the nature of the project and the economic life of the assets funded; generally up to 12 years for industrial projects and up to 15 years (exceptionally 20 years) for infrastructure projects, including industrial energy. Fees and charges are fixed in the interest rate loan agreement. The grace period is usually between one quarter and one third of the project life.

Like any long-term lender of their resources in the capital markets, the EIB loans require appropriate safeguards. This warranty is provided by the State concerned or (in the case of private sector projects) by banks or regarded companies.

The OPEC Fund for International Development (OFID) provides loans to the public and private sectors for energy programmes in concessional conditions, as well as grants to support small-scale renewable energy projects (table 8). This fund had participation in projects and investment opportunities in Latin America and the Caribbean, in countries such as Belize, Bolivia, Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, Paraguay, Peru, and Venezuela. Saint Lucia has engaged the fund through four projects, for which US\$22 million have been committed. Even though the projects are part of the transport, water and education sectors,¹⁹ the country could benefit from the already established relation with OFID.

Table 8
Types of investments per sector

Public sector (loans)	Private sector	Productive sector
Projects	Technical assistance	Manufacturing, transport and telecommunications
Programmes	Co-financing projects	Energy, water supply and sewerage
Balance of payments support	Emergency financing	Agriculture and agribusiness
	Lease finance (intermediaries)	Education
	Guarantees	

Source: Author's compilation.

¹⁹ i) Choc Bay-Gros Islet road and secondary roads improvement project, ii) Castries-Cul de Sac highway project, iii) Roseau Basin water supply project, and iv) Regional vocational and technical training project.

As of 2015, energy operations represented 23 per cent of the fund's commitments, approximately US\$ 4,096 million distributed among 86 countries. It is worth mentioning that OFID has aligned their energy portfolio with Goal 7-Affordable and Clean Energy- of the Sustainable Development Goals, acknowledging that energy is closely related to development and growth.

The fund offers investment options for the public, private and productive sectors (see table 7), through various services:

- Loans and lines of credit
- Share participation
- Operations quasi-equity (convertible loans, loans participatory and subordinates, preferred shares, convertible preference shares)
- Credit guarantees
- Insurance

Loans granted to developing countries are linked with average incomes, but most of the OPEC funding is made on concessional terms. In financing private sector, loan parameters are linked to country and project risks.

The Nordic Development Fund (NDF) mandate prioritises climate change and development since 2009. The fund focuses its investments on climate change adaptation and mitigation initiatives in low-income countries that are eligible for support from the International Development Association of the World Bank. Both the World Bank and the Inter-American Development Bank are partners of the NDF in the LAC region.

Some themes covered under climate change are sea level rise, extreme weather conditions and their effects on health and food security, reduction of GHG emissions through improved energy efficiency and use of renewable energy, sustainable transport, and wastewater and sewage treatment.

The NDF offers medium and long term loans with preferential conditions for government loans. Methods of sharing in investment projects include:

- Co-financing operations with bilateral organisations and mixed credit, mainly of Nordic origin.
- Co-financing operations with multilateral or international banks in the development of the private sector worldwide.

Priority is given to the following activities:

- Participation in joint ventures through subordinated loans with characteristics of equity. Priority is given to infrastructure projects with private sponsors in cooperation with public industry, including privatisations.
- Lines of credit to bank sub regional and national development rediscount mainly small and medium enterprises.
- Participation as a shareholder in the venture capital funds that extend the funding to promote the development of private and financial sector. It shows that investments in the private sector must involve some interest, mainly private.

The fund's participation in the productive sectors focuses on infrastructure projects such as energy, transport and telecommunications. It also prioritises social projects in the areas of health, education, water and sanitation.

Conditions of participation in projects and investment opportunities for Latin America and the Caribbean include the amount of the loan, where for example public sector loans usually range from € 1 up to €10 million. The NDF also provides grants, the amounts varies between € 2 million and € 5 million, according to the scope of the project. The funds are granted in Euros or are convertible to other available currencies.

In addition, NDF supports innovative proposals through the Nordic Climate Facility; these proposals could receive grants between € 250,000 and € 500,000.

The private sector can also participate in NDF joint ventures through the extension of subordinated loans with equity features; this is referred as loans that are part of a major loan. Under this system, financing may not exceed 15 per cent of the assets of the company.

Loans with government guarantees may reach extend up to a period of 40 years, including 10 years of grace. Loans with government guarantees enjoy a 0 per cent interest rate. Warranties for private projects cannot exceed 50 per cent of the total funding. The commitment fee is 0.5 per cent annually, and the service fee is 0.75 per cent annually.

The Caribbean Renewable Environmental Fund (CREF) of CARICOM seeks to provide equity and debt financing to renewable energy projects. CREF will co-invest with regional financial institutions (FIs) and also under the Caribbean Renewable Energy Development Programme (CREDP). CREDP eligible projects fall into two categories:

- (i) Grid-connected: wind, biomass co-generation, small and mini hydro, and geothermal.
- (ii) Off-grid and rural electrification: photovoltaic, micro hydro and solar water heating.

Projects are financed through the Caribbean Renewable Energy Technical Assistance Facility (CRETAF), which is a US\$ 1.6 million initiative that provides early-stage, high risk financing for qualified projects. The facility could assist developers in the preparation of proposals through analyses such as feasibility studies, resources assessments and environmental impact assessments.

Project qualification criteria:

- After tax Return on Investment (ROI) > 15 per cent
- Benefit costs ratios 1 or NPV > 0 or Discount Rate > 1.5
- Net foreign exchange savings
- Net reduction in green house gas (GHG) emissions
- Project equalised cost of energy and capacity < avoided cost of electric energy and capacity
- Show a strong potential for duplication
- Must have signed letter of support from the respective governments

2. Bilateral funds²⁰

The Inter-American Development Bank (IDB) finances projects to improve energy efficiency, promote cross-border energy integration and diversify the energy matrix. Some of these include large-scale wind farms, solar power for rural areas, bio fuel facilities and retrofitting hydroelectric facilities. The bank also supports pilot projects to test the viability of renewable energy initiatives.

IDB has approximately 30 energy projects that account for US\$ 2.4 billion in financing. Loans have been awarded for various purposes, the most important being institutional strengthening (US\$ 732 million), rehabilitation and efficiency (US\$ 376 million), distribution and transmission (US\$ 349 million), and hydropower projects (US\$ 250 million). IDB public sector operations support energy efficiency projects (mostly in a range above US\$ 100 million investment).

The Energy Sector Framework is organised in four strategic thematic lines that guide the bank's work:

- (i) Energy access
- (ii) Energy sustainability
- (iii) Energy security
- (iv) Energy governance

IDB offers various financial solutions:

- Types of partial credit guarantees or political risk guarantees.
- Use of guarantee enhancement of bond issues, project finance, asset-backed securities, securities backed by future flows, structured trade transactions.
- Amounts calibrated to optimise impact on the underlying instruments rating.
- Tenure: up to 30 years.
- Fees: facility fee charged for guarantees with sovereign counter-guarantee operations fees; operation fees are determined on a case-by-case basis.
- Local currency (LC) denominated guarantees offered subject to market availability.
- Fees charged in LC reflect IDB's fee structure for guarantees applicable at the time of approval.
- Called guarantees become a loan in the denominated currency; same terms and conditions of LC loans apply.

The bank provides funding particularly through its Inter-American Investment Corporation in close cooperation with UNDP and GEF of the World Bank. The IDB-GEF portfolio comprises 53 projects that total US\$ 301 million in GEF grants and US\$ 2 billion in co-financing from the bank and other counterparts. Approximately 25 per cent comes from IDB lending and non-lending instruments. These projects are grouped in four categories, namely multifocal, international waters, biodiversity and climate change. The latter registers 25 projects, mostly related to energy efficiency, renewable energy and carbon markets.

²⁰ Information regarding funds and programmes was retrieved from each institution's website.

Caribbean Development Bank (CDB). The bank provides loans as co-financier to the public and private sector with special interest in energy and environmental protection. In 2014, CDB approved projects for US\$ 243 million, of which, only US\$ 500,000 were destined to renewable energy and energy efficiency initiatives. However, it is worth mentioning that, in January 2014, the bank established a Renewable Energy and Energy Efficiency Unit to develop the institution's Energy Sector Policy and Strategy.

Energy security was designated as a strategic cross-cutting theme for the period 2015-2019. This is reflected in the bank's Energy Sector Policy, which has identified four focus areas for the period:

- (i) Promoting energy efficiency for more affordable and stable energy costs, and for establishment of a green economy
- (ii) Promoting renewable energy for more sustainable, affordable, and accessible energy, and for a green energy economy
- (iii) Promoting energy infrastructure to provide cleaner and more reliable power supply
- (iv) Promoting sector reform, good governance and capacity strengthening

In 2015, a Geothermal Risk Drill Facility was established at the bank to facilitate geothermal energy programmes. Conditions for participation in projects and investment opportunities Latin America and the Caribbean include the following:

- Amount: The minimum loan amount for the public sector is US\$ 200,000. Direct loans may be granted up to US\$ 750,000. The CDB finances up to between 70 and 80 per cent of the cost of the project, depending on the country involved. For private projects, it finances about 40 per cent of the cost of the project, considering only projects with certain level of debt/equity.
- Interest rates: 7.5 per cent semi-annually reviewable.
- Loan terms: maximum 10 to 30 years, depending on the country; and up to 14 years for private projects.
- Grace periods: up to 5 years depending on the country.
- Guarantees required: usually works with government guarantee.

The Energy and Climate Partnership of the Americas (ECPA) is an initiative led by the United States and supported by regional and multilateral institutions, such as OAS, IDB, OLADE and WB, as well as by the academia, private sector and civil society. ECPA focuses on seven priority areas:

- (i) Energy efficiency
- (ii) Renewable energy
- (iii) Cleaner and more efficient use of fossil fuels
- (iv) Energy infrastructure
- (v) Energy poverty
- (vi) Sustainable forests and land use
- (vii) Adaptation

ECPA follows a flexible and collaborative approach, through which countries can obtain guidance from best practices, share sustainable energy solutions, benefit from toolkits, and receive technical assistance in general. According to ECPA (2015), Saint Lucia participated in a series of initiatives that have already concluded, such as the ECPA Caribbean Initiative, the Energy Policy and Sector Analysis in the Caribbean and the Sustainable Communities in Central America and the Caribbean. In addition, the country is engaged in other initiatives that are still active, namely, Connecting the Americas 2022, Energy Innovation Centre and Low Carbon Communities in the Caribbean.

China Development Bank (ChDB). The bank specialises in medium to long-term financing facilities, with trajectory in financing infrastructure and industrial projects. The institution has assets up to US\$ 1 trillion dollars. Among their priorities are energy conservation and environmental protection projects.

The bank has participated in projects and investment opportunities in Latin America and the Caribbean with previous experience in Argentina, Brazil, Bolivia, Chile, Colombia, Ecuador, Mexico, Venezuela, and Peru.

It offers participation in infrastructure projects, basic/core industry and restructuring, innovation and improvement. Issuance of debt, evaluation and consultation guaranteed loans, loans in foreign currency remittances, securities in foreign currency exchange rate guarantee, and international agreement projects financed under loans. Interest rates are in line with the unified arrangements made by the ChBD. Interest rates may go down appropriately within the range stipulated by the ChBD.

Interest in participating in projects in the following productive sectors (in order of priority): construction of roads, railways, petroleum, petrochemical, coal, telecommunications, agriculture, forestry, water supplies, public infrastructure, education, social interest, international cooperation, emerging industries, restructuring, innovation, coordinated regional development, modernisation, protection environmental, energy conservation and emission reduction, cultural industry.

Regarding repayment, loans are divided into short-term (maturing within one year), medium-term (1-5 years) and long term (over 5 years). For large infrastructure projects, the maturity may be extended according to the needs of the industry.

The guarantees required vary depending on the type of project

Agence Française de Développement (AFD). This agency can provide funds for energy programmes to the private and public sectors, in particular to French interest areas. Besides loans for the public sector, AFD also works through banking intermediation, subsidies and partnerships, which are guided by the Sustainable Energy for All Initiative. Acknowledging the importance of energy for development, since 2007 AFD set up a Sectoral Intervention Framework for energy, which is articulated under three pillars: sustainable energy, energy security and access. In five years the amount for this sector quadrupled, and in 2011 comprised one third of AFD financing. Since 2007, energy projects have received € 5 billion.

The strategic objectives of the AFD in the Latin America and the Caribbean region are part of the priorities identified by the "French Cooperation Framework Document" and the following elements are priorities for intervention:

- Promotion of strategic alliances between France and Latin America, and between France and the Caribbean through the French overseas departments

- Support for the financing of public and private investment
- Support and drivers of inclusive urban policies and productive activities
- Assistance in the implementation of environmental policy and fight against climate change.

AFD has previous experience in Argentina, Brazil, Colombia, Ecuador, Haiti, Mexico, Nicaragua, Panama, Paraguay, Peru, Dominican Republic and the Caribbean as a whole.

Provides loans and grants, guarantees, grants overall budget, warranties and financing of SMEs overseas. AFD and its subsidiary PROPARCO (French Society for the Promotion and Participation in Economic Cooperation), combine grants with the wide range of financial instruments traditional and structured, including donations by private capital and innovative techniques loans and venture capital. Most of the funds of the AFD come from international financial markets.

Financial products are tailored to the needs of the recipient, the loans to States are generally long term and bonuses apply to interest rates, when the object of the funded activity requires.

AFD mainly focuses its operations in sectors enjoying comparative advantages and where the French experience and know-how is supported. The goal is also supporting or creating partnerships with authorities, regional authorities, companies and experts from the region. AFD focuses its interest in participating in projects of the following productive sectors:

- Public and private investment in infrastructure, particularly for energy efficiency and renewable energy
- Inclusive and driving urban policies and development for productive harmonious activities in cities
- Environment and policies that address climate change
- Agricultural, ecological production and forest management
- Trilateral Cooperation with Africa and the Latin America and Caribbean region.

AFD works through strategic alliances, partnering with multilateral and bilateral agencies in the region, such as IDB, ECLAC, World Bank, AECID of Spain, among others.

The French Society for the Promotion and Participation in Economic Cooperation (PROPARCO) has been promoting a green and inclusive role and also has contributed to the expansion of renewable energy.

Its participation in projects and investment opportunities in Latin America and the Caribbean addresses the problems of climate change and energy security, it finances flagship investments in renewable technologies, including the first important project of the solar energy marketplace. It is the first major PV project in Latin America. An important role is also played in a large number of infrastructure programs, particularly in the areas of telecommunications and transport.

PROPARCO has also contributed to the expansion of educational and health infrastructure, and the development of agribusiness, a sector that poses significant environmental challenges. In 2011, PROPARCO intensified its work in Argentina, Ecuador, Paraguay and Panama. PROPARCO has invested 27 per cent of its portfolio in the region.

In Latin America and the Caribbean 45 per cent of PROPARCO commitments are aimed at agribusiness financing. It increased its presence in Latin American banking, awarding Argentine,

Brazilian and Paraguayan banks a total of five credit lines dedicated to financing agribusiness. For some of these banks, plans for environmental and social action are developed in parallel. For example, in the case of Paraguay, the regional bank is committed to implementing a system for assessing environmental and social risks. PROPARCO offers the following services:

- Investment in capital to firms and banks
- Support for private equity investment
- Medium and long term loans
- Development of products in local currency, for local currency funded projects and foreign exchange risks facing the market.

In addition to funding in the form of loans, guarantees and subsidies, it supports its partners with training tools, analysis and evaluation.

Some conditions for participation in projects and investment opportunities in Latin America and the Caribbean are:

- Loan amount: PROPARCO usually provides funding between € 2 and € 100 million. Project promoters are usually required to provide 30 per cent of the cost in the case for a project expansion program and 40 per cent in the case of a new project.
- Repayment for projects of medium and long term is between 3 and 15 years.
- Grace periods are possible.
- Guarantees required: bank guarantee, warranty group, pawn, storage, others.

Private Energy Market Fund (PEMFUND of Finland). The Fund operates globally, but with special emphasis on those countries that have restructured and/or deregulated their energy sectors, such as Eastern Europe and Asia. PEMFUND has the support of FINNFUND, Electrowatt-Ekono and other private funds making investments, and acts as sponsors of activities.

The fund's method of sharing in investment projects is through joint venture interest in energy projects:

- Combined Heat and Power (CHP): these plants generate heat and electricity simultaneously on one floor. CHP have high operational efficiency and can use a variety fuels. These types of plants are typically more efficient than traditional plants and are environmentally sustainable.
- Alternative energy sources: as bio energy, urban waste or industrial.
- Energy Service Companies (ESCO).

Conditions for participation in projects and investment opportunities in Latin America and the Caribbean:

- Amount of investment: average investment is € 3 to 5 million.
- Participation: recipient must maintain a minority stake as a long term investor.
- Deadlines: fund may extend for about 4-8 years. This period is negotiable.

It is noteworthy that the PEMFUND favours their interests in companies or projects that have experienced local sponsors, highly qualified teams, environmentally sustainable projects, benefits from changes in the energy sector, provides expectations of future development, as well as those projects characterised by financial and technically manageable risks.

Commercial banks: a large number of commercial banks could be found in several countries. Under normal trading conditions, these banks offer loans to many types of projects. Notwithstanding the recent financial crisis development, the banking systems are functioning and providing loans, warranties, among others. It is also possible to get some line funding for micro projects.

3. Government agencies

It is important to frequently update (at least every month) the opportunities to present applications for funding in these development agencies, and also check the chances to present programmes for micro project (such as IPP).

Below is a list of governmental agencies that fund energy projects. The list includes only the main government agencies around the world.

- Abu Dhabi Fund for Development (ADFD) (in some occasions in cooperation with IRENA)
- Australia: Clean Energy Council (CEC) / Department of the Environment, Water, Heritage and the Arts
- Austria: Lebensministerium
- Canada: Canadian International Development Agency (CIDA) / Energy Efficiency Coalition
- Germany: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)
- Ireland: Sustainable Energy Authority of Ireland (SEAI)
- New Zealand: Ministry of Business, Innovation and Employment
- Norway: Ministry of Foreign Affairs and the Ministry of the Environment and International Development
- Spain: Spanish Agency for Development Cooperation (AECID) and Institute for Diversification and Saving of Energy (IDAE)
- The Netherlands: Ministry of Housing, Spatial Planning and the Environment (Dutch abbreviation VROM)
- United States: Agency for International Development (USAID) / National Research Energy Laboratory (NREL)
- Switzerland: State Secretariat for Economic Affairs
- United Kingdom: Department for International Development (DFID) /Department of Energy and Climate Change (DECC)

4. Carbon offsetting and Clean Development Mechanism (CDM)

Amid the struggle to deal with the consequences of climate change, the Clean Development Mechanism was adopted in the Kyoto Protocol in 2005 as a funding mechanism through the market to invest in the development of renewable energy in developing countries. Through this mechanism, developed countries -responsible for the emission of greenhouse gases- can promote renewable energy projects in developing countries by issuing Carbon Credits, which are supported by Certified Emission Reduction of greenhouse gases in the countries that receive the loans. However, the value of bonds in the market has been facing a downward trend, falling from a value of US\$ 30 to

US\$ 0.30, which has led many projects based on such funding to enter in a very precarious situation, even affecting Caribbean countries such as Jamaica.

The drop in demand has been affected due to the prevailing international economic crisis, and actions taken by the EU to restrict the use of this method.

This situation reveals the weakness of measures based on value stocks, as they do not necessarily guarantee the sustainability of resources needed for the development of renewable energy projects. Nevertheless, the General Director of IRENA in a recent interview in Lima (CoP 20) stated that such “new” green bonds reached US\$ 14 billion in 2013, and the estimate for 2014 was US\$ 40 billion and US\$ 100 billion for 2015.

Notwithstanding the hesitancy of the main CO₂ emitters in the world (see CoP 20 results), the idea of obtaining offsetting finance for no increase or reduced CO₂ emissions should not be acceptable for SIDS. The point is that AOSIS is trying to secure greater commitment for funds to mitigate climate change from big emitters and with this, try to survive in the long term as countries. Hence, any carbon mechanism used by SIDS will weaken these principled positions in international debates.

IV. Conclusions

Saint Lucia is highly dependent on imported fossil fuels for energy production, which makes the country vulnerable to price volatility and supply shortages. The country has a considerable amount of indigenous renewable energy resources, specifically for electricity generation based on geothermal energy, as well as wind and solar energies. The following proposals and actions on the part of the Government of Saint Lucia represent the key conclusions which should be considered in financing the developing these resources:

- Although the National Energy Policy and Sustainable Energy Plan were approved by Government Cabinet, supporting regulations should be enacted as they are binding to all companies and institutions. This step will provide confidence to investors and donors-sponsors.
- Geothermal, wind and solar power sources in Saint Lucia have been studied in detail. However, for various reasons, renewable energy generation plants have not yet been established. If plants come into operation, it is foreseeable that electricity prices should decrease and electricity demand should increase at a greater rate than previously estimated. This could potentially have a direct impact on poverty alleviation through decreasing tariffs.
- It is necessary to prepare plans to overcome the deficiencies, barriers and obstacles for deployment of regional, sub-regional and national level energy efficiency and renewable energy projects that have been shown to have success potential in several studies and reports done in last ten years. Some of the most important challenges are: human resources limitations (qualification and availability); low public awareness, reduced interest in energy efficiency and renewable energy from both public and private institutions; high cost of more efficient equipment and investments for renewable energy production; lack of cohesive regulations and policies to promote trust among private investors (foreign investment act); mutual agreements for foreign investments protection; agreements to avoid a double fiscal imposition and measures to promote investments in EE and RE); and deficient availability and transparency of statistical information on energy.
- Saint Lucia is one of the most proactive members of the Organisation of Eastern Caribbean States in terms of implementing energy efficiency related initiatives. In spite of this, some programmes are very incipient, such as the implementation of mandatory

inspections of vehicles on a regular basis; awareness campaigns on eco-driving, proper vehicle maintenance; or monitoring systems to measure the impact that energy efficient or renewable energy products have on sales, especially solar water heaters (ECONOLER, 2014).

- Only 7 per cent of the studied projects are of commercial type (2 of 29), and they have had a low impact on the energy sector.
- High electricity tariffs are one of the most important challenges. The search for implementable renewable electricity generation by the Government of Saint Lucia is anticipated to have positive effects on reducing electricity tariffs.

Based on macroeconomic forecasts, it is suggested that the Government of Saint Lucia acts as guarantor of loans and an organiser of international cooperation in the process of energy efficiency improvement and renewable energy investments.

The process of financing for energy related projects should start with emphasis on project elaboration. This task involves a number of steps, inter alia, determination of energy balance forecast and financing goals; conceptual design and feasibility study; precision on financing lines of those entities which offer financing; checking the existence of appeals and proper elaboration of document formalities. As noted by CREF, "...financing is not a problem: funds are available. Well-structured projects are missing" (CREF, 2011).

This complexity in the preparation of projects calls for the creation and training of task groups within relevant institutions to support project management and financing, whether they are for private enterprises, small independent power producers, or national programmes. These task forces should support the implementation of projects using the best techniques available for demand driver studies, methodology for project assessment, technologies and funding options.

An important group of multilateral, bilateral or government financing institutions is available and ready to fund projects. Therefore, it is necessary to apply a systematic approach to guarantee that project proposals fulfil all the obligations and requirements established by funders, sponsors and donors; and more importantly, to present the projects to the right funders. The best way to identify the right funding agency is by first defining the priority and scope of the project, which should be presented with a feasibility study.

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Annexes

Annex 1

Table A.1

Energy efficiency and renewable energy projects carried out in Saint Lucia Main financing agencies

STUDY						
Project type and name	Objectives	Implementing/ executing agency	Associated agencies	Funding	Status	Observations
Sustainable Energy A concept to Action	<p>To Promote Sustainable Energy on Island.</p> <p>To comply with its commitment as outlined in the Sustainable Energy for All declaration</p> <p>To get closer to attaining its renewable energy penetration timelines</p>	GOSL		Government of Taiwan	Ongoing	<p>Programme is broken into five components which address various areas for intervention</p> <ol style="list-style-type: none"> 1. Public sector energy efficiency programme 2. LED street lighting 3. Solar energy 4. Biogas digesters 5. Building institutional framework for sustainable energy capacity building
ESD Caraibe	<p>To develop and implement measures for promoting sustainable energy development within the buildings sector and to reduce greenhouse gas (GHG) emissions and make the energy sector more efficient and increase the use of renewable energy</p>	Caribbean Community Climate Change Centre (5Cs).	GOSL	GEF-UNEP	Ongoing	
Geo-Caraibes/ GSEII/ Geothermal	<p>To develop strategic frameworks for sustainable energy development in the islands— including the necessary policy and regulatory environment, institutional capacity, outreach and awareness, and project support to assess the technological capability of developing geothermal energy on Saint Lucia.</p>	Energy and Climate Change Division, OAS Department of Sustainable Development	UNEP & AFD	GSEII & USAID	2002-2006 (Study phase)	

Project type and name	Objectives	Implementing/ executing agency	Associated agencies	Funding	Status	Observations
12.6 MW Wind Farm	To reduce Saint Lucia's dependence on fossil fuels and to assist with diversifying the electricity generation mix.	LUCELEC/GTZ	Probyn Group, CREDP	Estimated € 12.2 million	2003-2011	<p>In 2002 "desk based" studies were undertaken to identify feasible sites for wind farm development. Four major potential wind farm sites were identified.</p> <p>In 2009 the GoSL agreed to acquire 210 acres of land at Sugar Mill for the development of a 12.6 MW wind farm.</p> <p>The GoSL expected to have a 12.6MW grid-connected wind farm in operation by 2011. The island's energy provider, LUCELEC, and its Canadian partner, The Probyn Group (owner, operator and financier of independent power facilities), have completed feasibility assessments for the site on the island's north-east coast.</p>
Preparation of a geothermal-based cross border electrical interconnection in the Caribbean	To determine whether the geothermal resources in Saint Lucia are technically suitable for exploitation and if developed it could lead to the possibility of submarine electrical transmission and interconnection with neighbouring islands such as Dominica and Saint Kitts and Nevis.	GOSL	Regional Council of Guadeloupe/ Regional Council of Martinique/ OAS / EU	Total Budget € 5.5 million, EU contribution €1.5 million	2008-2011	<p>Preliminary project costs suggest electricity could be generated at US\$ 0.06 to US\$ 0.10 per kWh.</p> <p>Sulphur Springs area identified as most suitable site for a geothermal power plant.</p>

Project type and name	Objectives	Implementing/ executing agency	Associated agencies	Funding	Status	Observations
St Lucia Ciceron Landfill Gas To Energy Project- Feasibility Study	<p>To generate electricity for the national grid from 11 years worth of solid waste dumped at Ciceron landfill (closed since 2003)</p> <p>To serve as an example in the Caribbean and to present opportunities for the transfer of the technology elsewhere.</p> <p>To reduce carbon emissions and acquire carbon credits through the Clean Development Mechanism – CDM</p>	GOSL/SDES	UNIDO/GSEII	GSEII fund, unknown	2005 - Finished pre-feasibility study. Afterwards, the project was cancelled	
Poultry Litter To Energy Project- Feasibility Study	To substitute grid electricity in local egg producing facility using electricity generated from poultry litter.	GOSL/SDES	Fresh Eggs Ltd	GSEII	2005 - Finished pre-feasibility study. After, the project was cancelled	This project would not be economically viable
BIOMASS - Waste Bananas To Ethanol Project	To develop a plant using excess and waste bananas to produce ethanol for use in transport fuel on the island.	Applied Renewables Caribbean	IDB/ GTZ Ideas Contest	US\$ 198,000	2010-2012	<p>The project is the winner of the 2009 IDEAS Energy Innovation Contest for Latin America and the Caribbean, sponsored by GVEP International, IDB, GTZ and the Korean Government</p>
Installation of a Micro Hydro Plant at Latille Waterfall / Micoud	<p>To promote ecologically sound renewable energy and develop plans for future action.</p> <p>Transformation of a tourism heritage site into a Renewable Energy Park</p>	University of Vermont through the Ministry of Commerce, Industry and Consumer Affairs	University of Vermont/ Sir Arthur Lewis Community College	University of Vermont	Completed (2006)	<p>The University of Vermont's project partner was John Joseph owner of the property in Latille where the micro hydro unit was installed.</p> <p>The hydro unit was installed to assist in reducing the cost of electricity on the property.</p>

Project type and name	Objectives	Implementing/ executing agency	Associated agencies	Funding	Status	Observations
Caribbean Sustainable Energy Program (CSEP)- [Saint Lucia]	Facilitate the adoption of energy policies and legislation in the seven Project Countries pertaining to address the market conditions for the development and use of renewable energy and energy efficiency systems by mitigating the barriers to their use	Energy and Climate Change Division, OAS Department of Sustainable Development	Caribbean Community (CARICOM) Secretariat, Caribbean Energy Utility Services Corporation (CARILEC), Caribbean Renewable Energy D	€ 1,970,457- European Union Energy Initiative - ACP-EU Energy Facility	2008-2011	The Department of Sustainable Development within the Organisation of American States received financing from the European Union Energy Initiative in 2008 for the implementation of the action entitled: increasing the sustainability of the energy sector in the Caribbean through improved governance and management. The working title for the project is Caribbean Sustainable Energy Program (CSEP).
National Energy Policy	To establish a policy framework to guide the sustainable development of the energy sector. To promote diversification of the energy portfolio. To promote environmental improvement and foster the adoption of renewable/cleaner energy technologies. To propose structures for the regulation of the power and transportation sectors.	Ministry of Physical Development and the Environment	LUCELEC (Power Company)	Financial support of the CREDP-GTZ and the OAS EU financed project CSEP in the latter stages.	2004-2010	
EE- Street Lighting Pilot Project		GOSL	LUCELEC (Power Company)	GOSL through OAS funds	Completed	
EE & RE - UNEP REPORT	To provide a series of tools to support renewable energy market development through the ECERA	UNEP/GOSL	Carbon War Room/DNVGL	UNEP/World Bank/GoSL	Ongoing	First phase of the report has been submitted for comments to various stakeholders.

Project type and name	Objectives	Implementing/ executing agency	Associated agencies	Funding	Status	Observations
EE - Applicability of Electric Mobility in Saint Lucia	To provide assistance in assessing the electric mobility solutions currently available and how these may be sustainably adapted to the circumstances of CARICOM member states.	Caricom/GOSL		Caricom/GOSL	Ongoing	The consultancy phase of this study was completed in January 2015
Sustainable Energy Plan	Ensuring the existence of adequate energy supplies to sustain economic development, while meeting current projected power demand. Reduction in energy demand and increase capacity via RE systems. Increase RE penetration and reduce Saint Lucia's dependence on imported fossil fuels in the medium to long-term.	SDES/Ministry of Physical Development of the Environment	OAS, Climate Institute	United Nations Industrial Development Organisation (UNIDO), Climate Change Institute	Completed	
EE - Applicability of Electric Mobility in Saint Lucia	To provide assistance in assessing the electric mobility solutions currently available and how these may be sustainably adapted to the circumstances of CARICOM member states.	Caricom/GOSL		Caricom/GOSL	Ongoing	The consultancy phase of this study was completed in January 2015
SOCIAL						
EE- The Cuban Light Bulb Project	Promotion of energy efficiency at an island wide level through introduction of large use of CFL's in the residential sector. Reduction in energy import bill. Cost savings for the households through reduction in electricity consumption.	Government of Saint Lucia through the assistance of the Cuban Government and Ministry. of Works, Transport and Public Utilities	MCWTPC & Social Community groups	Funds from Government of the Republic of Cuba	Completed	The Cuban government through the GOSL undertook a large scale distribution of CFL's within the residential sector to replace incandescent bulbs. The bulbs were donated and distributed by Cuban workers with the assistance of locals.

Project type and name	Objectives	Implementing/ executing agency	Associated agencies	Funding	Status	Observations
EE & RE - Duty Free Concessions On Energy Saving Devices	To promote the use of Renewable Energy technology in Saint. Lucia and to stimulate the use and importation of more energy intensive devices which would ultimately assist the country in reducing its electricity consumption and dependence on fossil based energy	SDES/ Ministry of Physical Development - Saint. Lucia	Customs & Excise Department, Inland Revenue Department	Funds from GOSL	Ongoing	Duty Free Concessions on Energy Saving Devices are offered in keeping with St. Lucia's commitment in becoming a sustainable energy demonstration country. Components included: deep discharge storage batteries, voltage regulators, inverters, cut-off switches, setup transformers, etc.
EE - Energy Awareness Week	To promote energy efficiency, conservation and Renewable Energy awareness at a national level. To sensitize students at high school and college levels, private sector and the general public about energy efficiency, conservation and RE measures which would ultimately translate into savings. To foster positive attitude changes towards energy efficiency	Min. of Physical Development and Environment - Sustainable Development & Environment Section	Various local and international private and public agencies	GOSL, CREDP/GTZ, UNIDO, Climate Institute	Ongoing One week each year	The week usually brings together a number of energy stakeholders including ESCo's, LUCELEC, and various public sector agencies with responsibility for various energy components. Energy Exhibition and school project competition- an inter-secondary School science competition with about 50 participants with 10 projects.
EE- Energy Conservation & Plant Maintenance Training Workshop/Course	To provide SLHTA members with an opportunity to become more sustainable and to provide them with certification	Saint Lucia Hotel & Tourism Association - SLHTA	Caribbean Program for Economic Competitiveness - CPEC	CPEC, SLHTA	Completed in 2000, 2004, 2009	Workshops targeted engineering/maintenance personnel and was focused on energy consuming areas usually found in small hotels. Areas covered: Electrical distribution systems, hot water systems, lighting, air conditioning and refrigeration.

Project type and name	Objectives	Implementing/ executing agency	Associated agencies	Funding	Status	Observations
EE - Energy Audits & Training Project For Hotel Industry	<p>To reduce greenhouse gas emissions by enhancing energy efficiency in the hospitality sector. To increase stakeholder awareness of energy management opportunities.</p> <p>To develop continuity in the energy management training field by supporting the development of a training host in Saint Lucia.</p>	By Lewis Engineering Inc., Marbek Resource Consultants, Inc.	Saint Lucia Ministry of Physical Development, Environment, and Housing	Climate Change Development Fund of the Canadian International Development Agency	Completed	Representatives from key stakeholder groups were brought together in Feb. 2004. The training sessions were part of a project being undertaken by Lewis Engineering Inc., Marbek Resource Consultants, Inc., and the Saint. Lucia Ministry of Physical Development, Environment, and Housing; and made possible due to the support of the Climate Change Development Fund of the Canadian International Development Agency.
EE & RE - The Caribbean Renewable Energy Development Programme (CREDP)- Saint Lucia	<p>To reduce greenhouse emissions by removing barriers to renewable energy development in Saint Lucia.</p> <p>To establish the foundation for a sustainable renewable industry. To create a framework under which regional and national renewable energy projects are mutually supportive. To remove incremental risks related to renewable energy.</p> <p>To remove barriers to renewable energy use in Saint Lucia and other Caribbean countries through specific actions to overcome policy, finance, capacity and awareness barriers</p>	CARICOM Secretariat / GTZ	CEIS/UNDP/ GEF/GTZ/ GSEII/ et al	UNDP/GEF/GTZ	Completed 1998-2009	

Project type and name	Objectives	Implementing/ executing agency	Associated agencies	Funding	Status	Observations
EE - Electricity Reform In The OECS (St. Lucia)	unknown	Unknown	Unknown	Unknown	Ongoing	
EE - Caribbean Energy Efficiency Lighting Project	To retrofit various government building with Efficient Lighting	GoSL		SIDS Dock/UNDP	Ongoing	This project is in its preliminary stage therefore the actual funding has not yet been received
COMMERCIAL						
RE - SOLAR RFP	To establish a 3.2 MW Solar Farm on island	LUCELEC	Carbon War Room/ DNVGL/GOSL	LUCELEC	Ongoing	The project will be done in two phases: Phase I will be financed by Lucelec which will include a 1MW Solar farm. Phase II financing unknown 2.2MW solar farm
RE - Waste to Energy RFQ	To establish a waste to energy plant on island	For tender	Carbon War Room/DNVGL/GOSL	For tender		RFQ is presently open for waste to energy plant and then RFP will be submitted too qualifying applicants
RE - Saint Lucia Geothermal Project	To assess the geothermal potential on island and develop a geothermal plant based on assessed potential	GOSL/Government of New Zealand		Government of New Zealand/ World Bank/GEF/ GoSL/ CCI/ SIDS DOCK	On Going	This project is split into various phases: Phase 1: Pre feasibility Study - mainly conducted by government of New Zealand and World Bank Phase 2: Feasibility Study Phase 3: Production Drilling Phase 4: Installation of Power Plant. Phase 1 of this project is due to commence in March 2015.
OIL - PETROCARIBE - Saint Lucia		NA	NA	Government of Venezuela	Ongoing	

Table A1 (concluded)

Project type and name	Objectives	Implementing/ executing agency	Associated agencies	Funding	Status	Observations
SOLAR - Photovoltaic Pilot Demonstration	<p>To demonstrate the applicability of photovoltaic electricity in Saint Lucia.</p> <p>To demonstrate net metering and the contribution of small scale renewable energy power producers to the main grid.</p> <p>This project is among several sustainable development focused initiatives undertaken by the BIT with the assistance of the European Union Special Framework of Assistance for 2003.</p>	Banana Industry Trust/Min. of Physical Development and the Environment	none	SFA 2003 - Environmental Management Fund Component	Completed	The first site is the Castries central market (a 4 KW system is planned for this building).
EE & RE - Solar Water Heater Financing	<p>Make solar water heating systems affordable and available on the general market by developing a financing mechanism for them, providing financial training awareness of the availability and benefits of those systems.</p>	St. Lucia Cooperative League	MIDEH, GSEII, UNIDO, OAS, ESG-Energy & Security Group	UNIDO-GSEII	Ongoing	<p>The program was designed by Global Sustainable Energy Island Initiative (GSEII).</p> <p>Program initially targeted households earning excess of EC\$3,000. However, this amount has been reduced to facilitate lower income earners.</p> <p>As of 2009, no new information on the success of this program was available</p>

Annex 2

Necessary steps for the financing process for each type of project (studies, social or commercial projects)

STUDY TYPE PROJECTS

Studies of policies, laws or quality (labelling & standard) and the evaluation of ideas are the simplest of all financial scheme and is comprised of the following steps:

- Project identification (definition of the Terms of Reference or outputs).
- Achieve consensus among stakeholders
- Study and determine intermediaries and possible sponsors or donors.
- Project presentation to funders
- Approval of project financing
- Hiring consultants or executors
- Development of the study: meeting objectives and timetables
- Review results with stakeholders
- Completion of the project.

Research and development (R&D) studies may be financed by grants from international financial institutions or banks, as well as the so called intermediaries.

R&D projects, from the starting point to pilot stage, have a more complex scheme funding process. The basic steps are:

- Project identification
- Consensus stakeholders
- Study and determination of intermediaries and potential sponsors or donors.
- Review of requirements of bidders
- Development of variants of the project as per requirements:
 - Situation analysis and barriers
 - Objectives
 - Strategy
 - Project results framework (until pilot test of the solutions)
 - Economic and finance or assessment
 - Budget and work plan
 - Project Board definition
 - Management arrangements
 - Monitoring framework and evaluation

- Risk log analysis
- Legal context
- Proposed project financing bidders (final or intermediate)
- Approval of project financing
- Hiring consultants or executors
- Development of the study: meeting objectives and timetables
- Review results with stakeholders
- Completion of the project.

SOCIAL TYPE PROJECTS

The main financial sources for social projects are governments and its development agencies. Furthermore, philanthropic institutions also finance such projects. Its scheme is essentially the same as that of R & D projects.

COMMERCIAL TYPE PROJECTS

Commercial projects are most complex project type to evaluate. The requirements of investors or financiers correspond to any assessment of a business. Precision is required in this kind of projects.

It is used to do the process to complete a commercial project using four different analytical levels. The whole process is iterative, where details are deeply studied from one level to other. There is a correspondence between each analytical level and the architecture and engineer works on the project, inter alias

- Level of concept and design: sketch map of the plant
- Level of study of opportunity: main solutions (architecture and engineering)
- Pre-feasibility level: basic engineering or architecture and engineer draft
- Feasibility level: detailed engineering or executive project (final design)

In addition, five viabilities are studied within each level:

- (i) Commercial viability: a study of demand and competition,
- (ii) Technical viability: technological possibilities for investment in the chosen site,
- (iii) Economic viability: balance of income and expenses over the life of the project. A project is economically viable when its benefits exceed its costs.
- (iv) Organisational viability: how shall be the company (investors, shares) and national regulations that project must be fulfilled.
- (v) Financial viability: financial indicators (Net present value; Benefit/Cost ratio; internal rate of return; payback period) and sensitivity analysis. A project is financially viable when it can be financed without liquidity problems