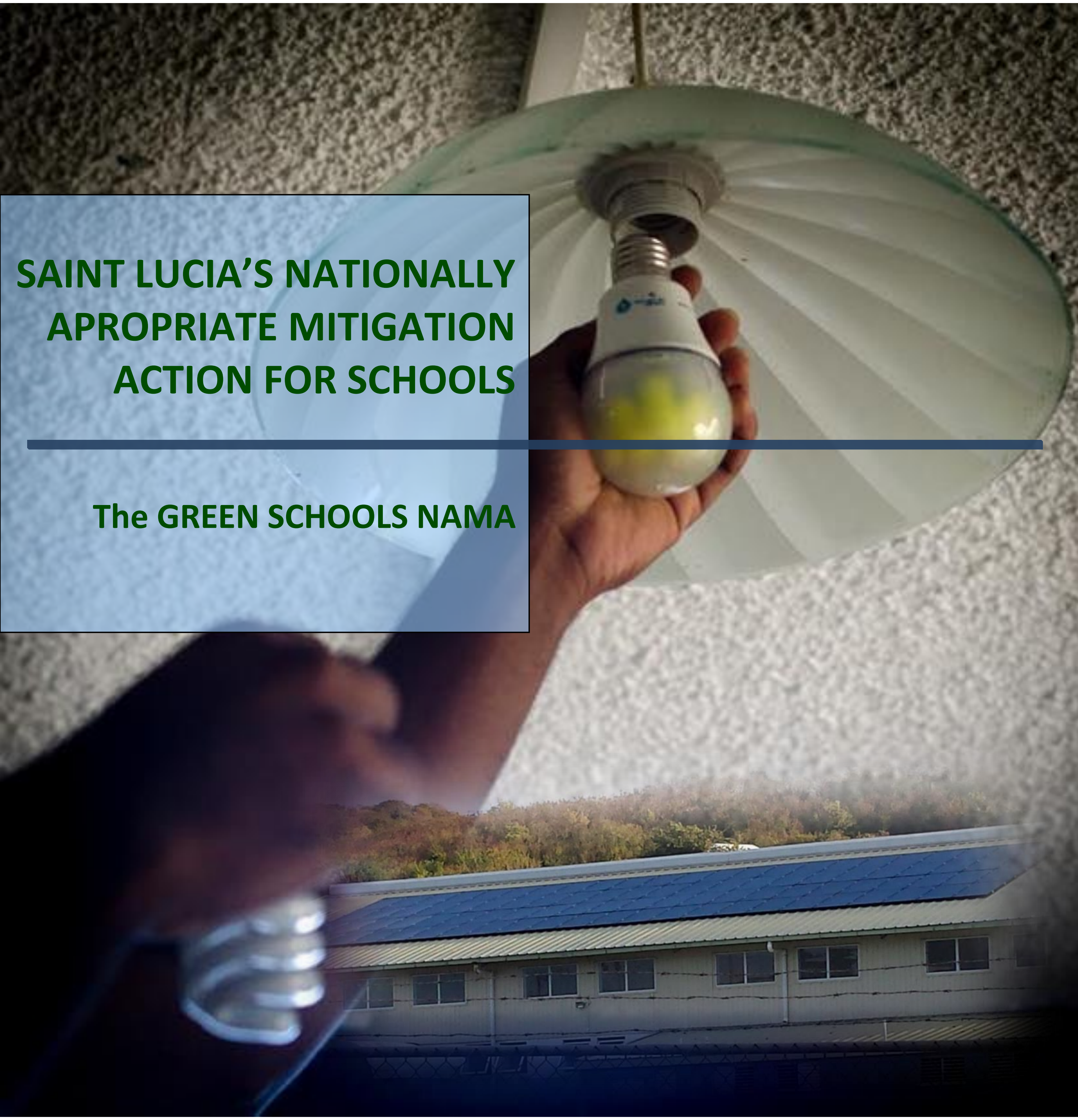
SAINT LUCIA'S NATIONALLY APROPRIATE MITIGATION ACTION FOR SCHOOLS

The GREEN SCHOOLS NAMA



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Saint Lucia's Nationally Appropriate Mitigation Action for Schools (Green Schools NAMA)

Prepared under the guidance of:
Renewable Energy Division, Department of Infrastructure, Ports and Energy; and, Department of Education, Innovation and Gender Relations

With the support of:
Government of Japan, through the United Nations Development Programme's (UNDP) Japan-Caribbean Climate Change Partnership (UNDP J-CCCP)

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Nationally Appropriate Mitigation Action (NAMA) for Saint Lucia

FOREWORD

Climate change induced by anthropogenic activities is one of the most important challenges currently facing the world and, in particular, Small Island Developing States (SIDS). The changes associated with this phenomenon, from rising sea levels to erratic rainfall patterns, stand to affect human health and well-being in a fundamental way. While impacts will differ substantially among and across regions, SIDS, including Saint Lucia, are among the most vulnerable to climate variability and change as a result of their small size, remoteness, and exposure to natural hazards. In the Caribbean region over the past three decades, average temperatures have already increased by 0.1° to 0.2° per decade, sea levels have risen by about two to four centimeters per decade, and North Atlantic hurricanes and tropical storms appear to have increased in intensity and frequency.

In response to these challenges, the United Nations Framework Convention on Climate Change (UNFCCC), through its Conference of Parties (COP), has prioritized the need for global cuts to greenhouse gas (GHG) emissions. The mechanism by which countries are encouraged to curb their respective national GHG emissions, the Nationally Appropriate Mitigation Actions (NAMAs), embodies the principles that emissions reductions occur in accordance with a country's common but differentiated responsibilities, its respective capabilities and with equity at its core. The NAMA therefore shapes the sustainable development of a country such as Saint Lucia towards a resilient, low-emission future.

The development of Saint Lucia's NAMA built on concrete steps already taken by the Government of Saint Lucia to mitigate emissions, detailed in the Nationally Determined Contribution, the Third National Communication and the National Energy Policy. The Saint Lucia NAMA will target the country's Education sector and specifically cover renewable energy and energy efficiency solutions and technologies in school buildings. This Green Schools NAMA will include targets of 20% reduction in energy consumption and 16% reduction of GHG emissions both to be achieved by 2025.

Saint Lucia's NAMA process is spearheaded by the Renewable Energy Division of the Department of Infrastructure, Ports and Energy in collaboration with the Department of Education. The NAMA process has benefitted from the inputs of multiple stakeholders, comprising public, statutory, academic and private sector bodies. Specifically, the process has benefited from the financial support of the United Nations Development Programme's (UNDP) Japan-Caribbean Climate Change Partnership (J-CCCP). The Department extends its thanks to all of the foregoing agencies for supporting the process and takes this opportunity to recognise the consultant, Mr. Manfred Stockmayer, and J-CCCP Programme Coordinator, Mr. Kurt Prospere.

Saint Lucia looks forward to forging partnerships and creating enduring alliances that will assist in implementing the measures and activities outlined in its NAMA. The country welcomes support, in the areas of finance, technology transfer and capacity building, from a variety of sources, including public, private, bilateral, multilateral and alternative sources, all in an effort to help the country build climate resilience and address the seemingly insurmountable phenomenon of climate change.

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ABBREVIATIONS

AC	Air Conditioning
BAU	Business as Usual
CAFF	Climate Adaptation Financing Facility
CARICOM	Caribbean Community
CERC	Contingent Emergency Response Component
COP	Coefficient of Performance
CREDP	Caribbean Renewable Energy Development Programme
DSM	Demand-side management
DVRP	Disaster Vulnerability Reduction Project
EAP	Energy Action Plan
EE	Energy Efficiency
EPDC	Education Policy and Data Center
GCM	General Circulation Model
GEF	Grid Emission Factor
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GoSLU	Government of Saint Lucia
GWh	Gigawatt hours
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
J-CCCP	Japan-Caribbean Climate Change Partnership
LEAP	Long-range Energy Alternatives Planning system
LED	Light Emitting Diode
lm	lumen
LPG	Liquefied Petroleum Gas
LUCELEC	St. Lucia Electricity Services Ltd.
LULUCF	Land-use, land-use change and forestry
K	Kelvin
kW	Kilowatt
kWp	Kilowatt peak
MA	Mitigation Assessment
MDG	Millennium Development Goal
MoFSLU	Ministry of Finance of Saint Lucia
MW	Megawatt

MWh	Megawatt hours
NAMA	National Appropriate Mitigation Action
NAMA CA	NAMA Coordinating Authority
NAMA EE	NAMA Executing Entity
NAMA IE	NAMA Implementing Entity
NAMA NA	National NAMA Approver
NCCC	National Climate Change Committee
NDC	Nationally Determined Contribution
NEP	National Energy Policy
NGO	Non-governmental Organisation
NURC	National Utilities Regulatory Commission
OECS	Organisation of Eastern Caribbean States
PPCR	Pilot Project for Climate Resilience
PPP	Purchase Power Parity
PV	Photovoltaic
RCM	Regional Climate Models
SALCC	Sir Arthur Lewis Community College
SB	Standardized Baseline
SE4ALL	Sustainable Energy for all
SEP	Sustainable Energy Plan
SIDS	Small Island Developing States
SLU	Saint Lucia
SNC	Second National Communication
SST	Sea Surface Temperature
TNC	Third National Communication
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	US Dollars
W	Watt
XCD	Eastern Caribbean Dollar

EXECUTIVE SUMMARY

Nationally Appropriate Mitigation Actions (NAMAs) are voluntary, non-binding policy instruments that provide a framework for pursuing a country's socioeconomic and development goals, while contributing towards global greenhouse gas mitigation efforts. NAMAs were first introduced at the 13th Conference of Parties to the UNFCCC (COP13) in Bali in 2007.

The Government of Saint Lucia has already taken concrete steps towards defining mitigation actions to address national vulnerabilities. The Nationally Determined Contribution (NDC) sets a conditional target of a GHG emission reduction of 16 per cent by 2025 compared to its business as usual (BAU) scenario and a reduction of 23 per cent by 2030. The Third National Communication (TNC), published in September 2017, includes an updated GHG inventory as well as an assessment of mitigation options in the six UNFCCC mitigation sectors, namely energy demand, electricity generation, agriculture, industrial processes, land-use, land-use change and forestry (LULUCF) and waste.

The Government of Saint Lucia is one of eight countries receiving support from the Japan-Caribbean Climate Change Partnership (J-CCCP) in advancing the process of low-emission risk-resilient development by improving energy security and integrating medium to long-term planning for adaptation to climate change. One of these activities is the preparation of a National Appropriate Mitigation Action (NAMA) in the energy sector of Saint Lucia, covering renewable energy and energy efficiency solutions and technologies in school buildings in Saint Lucia, the "Green Schools NAMA".

The NAMA covers primary and secondary schools across the entire island of Saint Lucia. The NAMA covers all GHG emission related activities in school buildings (such as lighting, air conditioning or cooking) as well as renewable energy generation on school sites.

To compare GHG emission reductions generated under this NAMA, a baseline was developed, which projected current energy consumption and related GHG emissions of all schools covered by this NAMA into the future. In the baseline, energy consumption will increase from 2,933 MWh in 2016 to 3,190 MWh in 2025, which is an increase of 8.8 per cent. In the same time period, GHG emissions will increase from 1,884 tons to 2,057 tons, an increase of 9.2 per cent.

The following targets were defined under the Green Schools NAMA (all targets are based on the activities covered in the NAMA boundary):

- Reduction of energy consumption of 20% by 2025 (this is based on the 20% target for the public sector defined in the Barbados Declaration on Achieving Sustainable Energy for All in Small Island Developing States (SIDS))
- Reduction of GHG emissions of 35% by 2025 (overshooting the target of 16% by 2025 defined in the NDC).

The NAMA will also positively contribute to a number of Sustainable Development Goals (SDGs), namely: SDG 7 – Affordable and clean energy, SDG 8 – Decent work and economic growth, SDG 9 – Industry, innovation and infrastructure, SDG 13 – Climate action and SDG 17 – Partnerships for the Goals. Contributing to these SDGs will also contribute to various national strategies and targets and will support the following national strategies and targets:

- Capacity building and education
- Improve access to clean and sustainable energy
- Improve access to sustainable technology
- Improve energy security
- Creation of additional jobs

- Improve policy and planning

The NAMA includes the following interventions:
- Intervention 1: Energy efficiency
- Intervention 2: Renewable energy
- Intervention 3: Training and capacity building

Under Intervention 1, a total of 13,500 lamps will be replaced by efficient LED tubes, leading to savings in electricity consumption of 537.3 MWh and CO2 emission reductions of 356.8 tons per year (applying the Grid Emission Factor of 0.664 tCO2/MWh). Compared to the baseline figure in 2025, this is a reduction in energy consumption of 16.8 per cent and a reduction in GHG emissions of 17.3 per cent.

Under Intervention 2, solar PV systems for power generation will be installed in primary and secondary schools. The objective is to cover the majority of electricity requirements of the schools such as lighting, air conditioning, ventilation, office equipment and cooling. It was assumed that 50 per cent of the schools will be ready for installation of solar PV units (e.g. due to proper roofing structure to carry solar PV units). In total, 375 kWp will be installed in primary and secondary schools; this equals approximately 1,340 panels with a total size of around 23,000 sq ft. The expected annual electricity generation from these solar PV units is 487.5 MWh, the annual emission reduction is 323.7 tons of CO2 per year. Compared to the baseline figure in 2025, this is a reduction in GHG emissions of 15.7 per cent.

The implementation of Intervention 1 and Intervention 2 will be accompanied by an extensive training and capacity building programme under Intervention 3. This will include establishment of an energy accounting system covering all primary and secondary schools, capacity building & awareness trainings for companies and institutions and a curriculum on sound environmental management and sustainable development.

Total costs of the NAMA are estimated at around USD 2.1 million. The majority of these funds (USD 1.4 million) will be used for implementing solar PV units, around USD 0.5 million are used for LED lamps and the remaining funds will be used for capacity building. The installation of LED tubes shows attractive payback periods of 4 to 5 years, investment in larger (25 kW) solar PV units has a payback period of 10 to 11 years.

Implementation of the NAMA will be led by the Department of Education in collaboration with the Department of Economic Development as the NAMA Coordinating Authority (NAMA CA). The Department of Sustainable Development will act as NAMA Approver. The role of the NAMA Implementing Entity (NAMA IE) will be taken by the Department of Education in collaboration with the Renewable Energy Division of the Department of Infrastructure, Ports and Energy.

1 INTRODUCTION

The success of the Paris Agreement signals a significant step towards the future of climate action. This UNFCCC-led process involving over 190+ parties led to an agreement in December 2015 that saw countries agree to cut emissions with the aim of limiting temperature increase. The agreement lays down several "building blocks" that can help the world collectively undertake climate actions and Nationally Appropriate Mitigation Actions (NAMAs) are expected to play an important role in driving this transformation.

NAMAs are voluntary, non-binding policy instruments that provide a framework for pursuing a country's socioeconomic and development goals, while contributing towards global greenhouse gas mitigation efforts. NAMAs were first introduced at the 13th Conference of Parties to the Kyoto Protocol (COP13) in Bali in 2007.

Many developing countries are taking steps to develop and implement NAMAs, which can help countries achieve their growth objectives and participate in the global climate change mitigation agenda. NAMAs help governments leverage national and international support to achieve appropriate, effective and transformational GHG mitigation and sustainable development targets for the country and within communities.

Though not explicitly mentioned in the Paris Agreement, NAMAs are currently the only "framework for non-market approach to sustainable development" (as noted in the Paris Climate Agreement) and are expected to play an important role in helping developing countries plan and execute mitigation actions as elaborated in their NDCs (Nationally Determined Contributions). Moreover, the overall scope of a NAMA, i.e. mitigation action combined with sustainable development leading to sector transformation, makes it an ideal framework that can successfully balance national development priorities with global climate actions.

1.1 NAMA AS AN OPPORTUNITY FOR SAINT LUCIA

The Government of Saint Lucia has already taken concrete steps towards defining mitigation actions to address national vulnerabilities. The Nationally Determined Contribution (NDC) sets a conditional target of a GHG emission reduction of 16 per cent by 2025 compared to its business as usual (BAU) scenario and a reduction of 23 per cent by 2030. The Third National Communication (TNC), published in September 2017, includes an updated GHG inventory as well as an assessment of mitigation options in the six UNFCCC mitigation sectors, namely energy demand, electricity generation, agriculture, industrial processes, land-use, land-use change and forestry (LULUCF) and waste.

The Government of Saint Lucia is one of eight countries receiving support from the Japan-Caribbean Climate Change Partnership (J-CCCP) in advancing the process of low-emission risk-resilient development by improving energy security and integrating medium to long-term planning for adaptation to climate change. One of these activities is the preparation of a National Appropriate Mitigation Action (NAMA) in the energy sector of Saint Lucia, covering renewable energy and energy efficiency solutions and technologies in school buildings in Saint Lucia, the "Green Schools NAMA".

The NAMA differs from traditional funding mechanisms for energy efficiency and renewable energy projects mainly because of three key components, summarized in Figure 1 figure below:

- **Alignment with national development objectives**: The interventions under a NAMA framework must be compatible with the host country's policy and development objectives, with the NDC as the main document.
- **Focus on sustainable development**: The NAMA is designed with sustainable development benefits in mind. The design includes a focus on interventions which promote sustainable benefits, such as access to clean and sustainable energy or energy security.
- **Facilitation of transformative change**: The NAMA will spur the development of an environment which facilitates a transformative change in the energy sector by focusing on energy efficient technologies and renewable energy sources. The Green Schools NAMA can also be a forerunner for activities in other sectors.

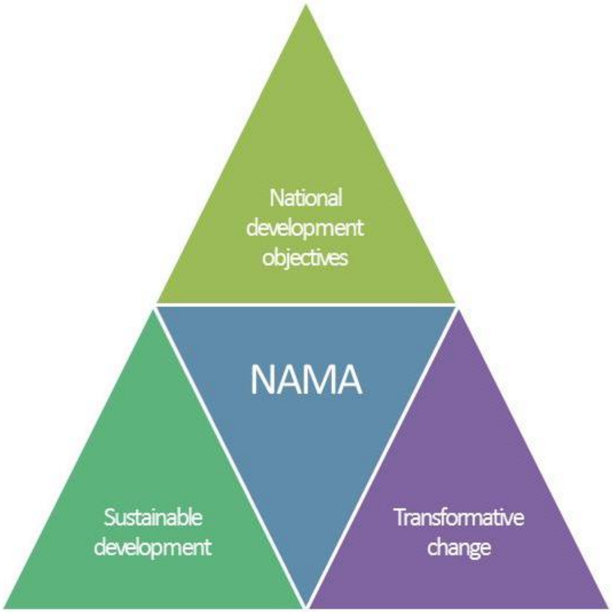

Figure 1: NAMA Components

2 BACKGROUND TO THE COUNTRY

Saint Lucia is part of the Commonwealth Realm. Saint Lucia is a full and participating member of the Caribbean Community (CARICOM), Organisation of Eastern Caribbean States (OECS) and La Francophone. The capital city of Saint Lucia is Castries. Castries is also the political centre of Saint Lucia, and home to its Ceremonial Head of State. Saint Lucia has a population of 186,000 and the city of Castries has a population of 22,000. (MoFSLU, 2013 upd. 2016)

2.1 GEOGRAPHY

Saint Lucia is one of the Windward Islands belonging to the Caribbean Islands. The island is located on the southern arc of the Lesser Antilles chain at the eastern end of the Caribbean Sea bordering the Atlantic Ocean. It has Saint Vincent and the Grenadines in the south and Martinique in the north, at latitude/longitude 13° 59' N, 61° 0' W.

Figure 2: Map of the Caribbean Islands

Source: Ministry of Finance

Figure 3: Map of Saint Lucia
Source: Ministry of Finance

The island is a typical Windward Island formation of volcanic rock that came into existence long after much of the region had already been formed. It is part of the wider Antillean Arc of islands that are geologically young, not more than 50 million years old and predominantly volcanic in origin (MoFSLU, 2013 upd. 2016). The northern, central and eastern parts of the island tend to display a softened, rounded topographic quality reflecting old geologic age, erosion and weathering. The west and southwestern edges of the country are geologically newer with more rugged and steeper mountainous terrain and dramatic drops.

Saint Lucia is dominated by dense forest and a central ridge of forested mountains with broad, fertile valleys[1]. Dozens of small rivers cross the island and which is ringed by miles of sandy beaches, as well as many small bays. It is well known for the two towering volcanic cones on the southwest coast, Gros Piton and Petit Piton. The island's highest peak, Mount Gimie, is positioned in the south-central mountain range and rises to 958 m above sea level.

Figure 4: The twin Pitons

[1] http://www.worldatlas.com/webimage/countrys/namerica/caribb/stlucia/lcland.htm#page

2.2 CLIMATE AND CLIMATE CHANGE

Saint Lucia is ranked first in the Americas most at risk from climate change by the Global Sustainability Report 2015. The report prepared by TERI ranks the top 20 countries (out of 193) and the top 20 countries in the different regions most at risk from climate change based on the actual impacts of extreme climate events documented over a 34-year period from 1980 to 2013 (TERI, 2015)[2]. The cost of inaction on climate change in Saint Lucia is estimated to be 12.1% of GDP by 2025, increasing steadily to 49.1% of GDP by 2100. (GoSLU, 2016)

2.2.1 CURRENT CLIMATE AND CLIMATE SCENARIOS

Saint Lucia experiences a tropical maritime climate, situated within the north-east Trade Wind belt it is normally under an easterly flow of moist, warm air. Air temperature is averaging approximately 28°C and average ambient sea surface temperatures vary little from 26.7°C. The Island has two climatic seasons based on rainfall as the wet season extends from June to November while the dry season runs from December to May. Highest average wind speeds reach 24kmh-1 during the months of January to July, corresponding roughly with the dry season. Between August and December, the speeds average 16kmh-1. (GoSLU, 2011)

Historically, hurricanes, storms and flooding have been the most likely hazards to affect Saint Lucia (GoSLU, 2006). Saint Lucia is also vulnerable to earthquake hazards and has experienced drought conditions each year since 2012. (GoSLU, 2016)

Over the past three decades, average temperatures in the region have increased by 0.1° to 0.2°C per decade and sea level rise has occurred at a rate of about two to four cm per decade. In addition, North Atlantic hurricanes and tropical storms appear to have increased in intensity over the past thirty years, although there is still debate about whether this is a long-term trend. (GoSLU, 2016)

CARIBSAVE has made projections of temperature, precipitation, sea surface temperatures and tropical storms and hurricanes for Saint Lucia (CARIBSAVE, 2012). The results have led to great concerns about impacts on the various socio-economic sectors and natural systems, and their further implications for the tourism industry.

- Climate Modelling Projections for Saint Lucia Temperature: Regional Climate Models (RCMs) indicate increases ranging from 2.4˚C and 3.3˚C by the 2080s in higher emissions scenarios.
- Precipitation: General Circulation Models (GCMs) indicate overall decreases in annual rainfall of -37 to +7 mm by 2080, with RCMs are indicating decreases between -11% and -32%.
- Sea Surface Temperatures (SST): GCM project annual mean SST increases of +0.8 to 3˚C by 2080s.
- Tropical Storms and Hurricanes: North Atlantic hurricanes and tropical storms appear to have increased in intensity over the last 30 years. Observed and projected increases in SSTs indicate potential for continuing increases in hurricane activity and model projections indicate that this may occur through increases in intensity of events but not necessarily through increases in frequency of storms." (CARIBSAVE, 2012).

[2] http://www.ipsnews.net/2015/02/everything-you-wanted-to-know-about-climate-change/

2.2.2 SUSTAINABLE DEVELOPMENT EFFORTS AND EXPECTED IMPACT OF CLIMATE CHANGE ON SOCIAL DEVELOPMENT

The main condition for sustainable development is the preservation of the capital stock of natural resources in Saint Lucia. Saint Lucia's extreme vulnerability to climate change, such as sea level rise and the increased intensity and frequency of extreme weather events, has caused evident negative effects in the decline of coastal tourism and in performance of economic sectors such as agriculture and fishing.

Tourism is the main economic driver in the Caribbean and contributes to around two thirds of Saint Lucia's Gross Domestic Product (GDP). Primary and secondary climate change impacts on this sector must both be considered seriously. Climate change is affecting related sectors such as health, agriculture, biodiversity and water resources that in turn impact on tourism resources and revenue in ways that are comparable to direct impacts on tourism alone.

The Government of Saint Lucia is extremely concerned that climate change may damage social and economic infrastructure, this includes all education facilities on the island (MoFSLU, 2013 upd. 2016). The Government is already using and aims at increasing the use of education facilities as disaster shelters by improving the resilience of the infrastructure. Measures planned under this NAMA, such as solar PV units, which can also operate in case the electricity grid is down, will have a positive impact on that aim.

2.2.3 LINKAGES BETWEEN EXISTING MITIGATION STRATEGIES AND DISASTER RISK MANAGEMENT ACTIVITIES

Under the five-year Disaster Vulnerability Reduction Project (DVRP), running from 2015 to 2019 and financed by World Bank and the Pilot Programme for Climate Resilience (PPCR), Saint Lucia will work at reducing vulnerability to natural hazards and climate change (MoFSLU, 2013 upd. 2016). The credit finances vulnerability reduction and post-disaster reconstruction activities in the health, education and infrastructure sectors throughout the island.

The project consists of five components, namely:
(1) Risk Reduction and Adaptation Measures;
(2) Technical Assistance for Improved Assessment and Application of Disaster and Climate Risk Information in Decision-Making;
(3) Climate Adaptation Financing Facility (CAFF);
(4) Contingent Emergency Response Component (CERC); and
(5) Project Management and Implementation Support.

The regional project 'Japan-Caribbean Climate Change Partnership (J-CCCP) (2014)', being implemented in collaboration with UNDP, will help the Caribbean countries to put in practice actions and policies to reduce greenhouse gas emissions and adapt to climate change. (GoSLU, 2016)

Previously, the Government of Saint Lucia has undertaken several initiatives at the national, regional and international level to reduce the impacts of natural and man-made hazards (GoSLU, 2006). The most relevant initiatives included:
- A National Building Code to improve the construction quality of structures - in order to minimise the impact of the main natural hazard events on the Island's infrastructure and properties
- A Disaster Management Programme for schools and libraries

- A Study and Design of Coastal Protection for Dennery Village

The Hazard Mitigation Policy from 2006 (GoSLU, 2006) outlines measures for long-term multi-hazard mitigation in order to minimize the harmful impacts of hazards on the social and economic sectors of Saint Lucia and reduce hazard vulnerability in order to save cost on recurrent incidents and rehabilitation after a disaster.

The most direct relevant actions for long-term multi-hazard mitigation for this NAMA relates to impacts of Climate Change and other natural hazards within the two sectors ‘settlements and infrastructure’ and ‘coastal and marine resources’, including:

- assessment of human settlements and related infrastructure at risk;
- fiscal measures to promote the use of climate risk reduction technologies and practices;
- a national land use and management plan, incorporating climate and other natural hazard concerns and identifying suitable locations for future settlements;
- a plan for the relocation of settlement utilities and infrastructure at risk;
- a building code that addresses all natural hazards;
- ensure that national infrastructure standards are adequate to withstand the impacts of climate and other natural hazards;
- adopt physical planning standards and tools that facilitate adaptation and adoption as well as retreat and relocation of human settlements from vulnerable areas;
- policies and strategies that encourage non-coastal development; and
- measures to protect coastal areas.

Saint Lucia’s ‘Disaster Management Policy Framework’ from 2004 has had the purpose to advance an approach to disaster management that focuses on reducing human-, economic-, environment- and property risks, especially to vulnerable areas due to poverty and a general lack of resources. It involves all government institutions, the private sector and civil society and other players, as well as all activities related to disaster management. (GoSLU, 2004)

2.3 ECONOMY

Saint Lucia is classified by the UN as a Small Island Developing State (SIDS) and as an upper middle income country by the World Bank[3].

The Gross Domestic Product (GDP) of Saint Lucia has increased steadily over the last ten years, with an average of 1.27 USD billion. Saint Lucia makes the 158th largest economy in the world with the current GDP. Factoring in Purchase Power Parity (PPP) to the GDP per capita makes the island the 96th richest country in the world[4].

	2015	2014	Highest over 10 years	Unit
GDP	1.44	1.40	1.44	USD billion
GDP growth	1.76	0.46	8.22	%
GDP per capita	7,764	7,648	7,764	USD
GDP per capita growth	1.02	-0.28	6.77	%
GDP per capita, PPP	10,991	10,772	10,991	USD

[3] http://data.worldbank.org/?locations=LC-XT

[4] http://www.worldatlas.com/finance/saint-lucia/gdp.html

Table 1: Saint Lucia's key GDP figures
Source: www.worldatlas.com|Word Bank

Saint Lucia's two main economic sectors are tourism and agriculture, where tourism is since 1990 leading the economic growth. Between 1990 and 2006, the contribution of agriculture declined from 13.85% to 3.24% of GDP while the tourism sector's contribution moved from 9.18% to 12.55% in the same period (GoSLU, 2011). Tourism is today accounting for 65% of GDP and is Saint Lucia's main source of jobs, income and of foreign exchange earnings. Tourism has however further experienced a slowdown since airlines in 2012 started to cut back on their routes to Saint Lucia after the financial crisis in 2008. Furthermore, in 2012, public debt was as high as 77% of GDP. In that same year Saint Lucia introduced a value added tax of 15%, becoming the last country in the Eastern Caribbean to do so.[5]

[5] http://www.theodora.com/wfbcurrent/saint_lucia/saint_lucia_economy.html

3 BACKGROUND TO SECTORS COVERED BY NAMA

3.1 ENERGY SECTOR

The energy generation mix in Saint Lucia consists of 99.9% diesel and 0.1% solar (Laboratory, 2015) and the island is almost totally dependent on imported energy (Tulsie, 2010).

Saint Lucia has a large technical potential for geothermal (as it is a volcanic island), wind, and solar renewable energy generation. There is little potential for biomass or hydropower. The most promising hydroelectric spot is the Roseau Reservoir, which can supply 150 kilowatts (kW), otherwise rivers and waterfalls on Saint Lucia do not have a base flow rate sufficient to power water turbines. A biomass plant requires large tracts of agricultural land and is not economically feasible. (Laboratory, 2015).

Saint Lucia has a renewable energy goal to generate 35% of the country's energy from renewables by 2020 (Laboratory, 2015). A Sustainable Energy Plan (SEP) was adopted in 2002 which identifies a number of short and medium-term renewable energy targets. A National Energy Policy was approved by the Cabinet of Ministers in June 2010. At present, steps are being taken to revise the Electricity Supply Act, which addresses electricity generation, in order to, among other things, more effectively allow for the generation of electricity from renewable energy sources (GoSLU, 2011).

The Designated Institution for Renewable Energy in Saint Lucia is the Department of Infrastructure, Ports and Energy and the National Utilities Regulatory Commission (NURC) is the Regulator (Laboratory, 2015).

3.2 ELECTRICITY SECTOR

Privately owned 'St. Lucia Electricity Services Limited' (LUCELEC) is the sole electrical utility for Saint Lucia and has a customer base of more than 61,000. The Government of Saint Lucia owns 12.4 per cent of the shares, and the Castries City Councils holds 16.3 per cent. The rest is held by different private companies (LUCELEC, 2017). LUCELEC has an installed electricity generating capacity of 88.6 megawatts (MW), with peak demand of approximately 60 MW.

LUCELEC's power generation is based entirely on conventional diesel. However, the company has expressed an interest in moving into renewable forms of energy, such as wind, solar PV and geothermal. LUCELEC has increased generation capacity in order to keep up with the growing electricity consumption in the domestic, hotel and commercial sectors. (GoSLU, 2011)

91 per cent of the total population in Saint Lucia has access to electricity (100 per cent in urban areas and 80 per cent in rural areas).

3.3 EDUCATION SECTOR

The education system in Saint Lucia consists of a compulsory seven years in primary school between the ages of 5 to 11, five years in secondary school between 12 to 16 years of age, and tertiary school from the age of 17 and onwards.

In school-year 2016/2017 Saint Lucia had in total 74 primary schools, 23 secondary schools, 9 post-secondary and tertiary schools including 4 offshore medical schools, and 3 skills training centres.

The primary school with the highest number of students in Saint Lucia is the “Dame Pearlette Louisy Primary” with 975 enrolled students in the school-year 2016/2017, taking up 6 % of all enrolled primary students in Saint Lucia, followed by “Camille Henry Memorial” with 729 enrolled students and Carmen Rene Memorial with 633 enrolled students. The secondary school with the highest number of students is the “Vieux Fort Comprehensive” with 1,079 enrolled students, corresponding to 8 % of all secondary students enrolled, followed by “Castries Comprehensive” and “St. Joseph's Convent” with 749 and 686 students enrolled, respectively.

“Sir Arthur Lewis Community College (SALCC)”, the only community college on the island, is the biggest tertiary school covering 57 % of the enrolment to post-secondary and tertiary schools with 2,297 enrolled students in the school-year 2014/2015.

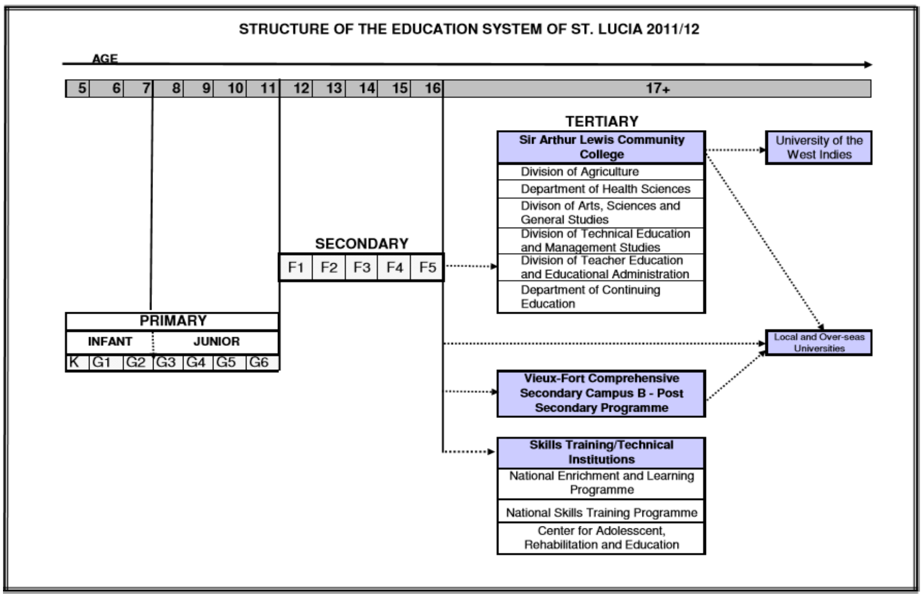

Figure 5: Structure of education system

Saint Lucia has seen a general trend of decrease in school enrolment over the last years. Enrolment in primary schools has over five years decreased by 12 % and in secondary schools by 16 %. Among primary schools, only 58 % of the capacity was used in the school-year 2014/2015, which was a decrease over the last five school-years with 8 percentage points. Among secondary schools 80 % of the capacity was used, which over the last five school-years was a decrease with 14 percentage points.

Over the same time period there has been an increase in number of teachers with 1 % for primary schools and 6 % for secondary schools.

The tables below also show the projected number of students and teachers both in primary and secondary schools over the period 2015/2016 to 2017/2018. Number of students in primary schools is expected to stay more or less stable, whereas the number of students in secondary schools is expected to decrease by about 10 per cent over three years.

The following table gives an overview on key data for primary and secondary schools, like total number of schools, number of students, or usage of capacity.

Primary	School-year	Number of schools	Number of students	Number of teachers	Average school size	%-age usage of capacity
	2010/2011	75	17982	998	240	66%
	2011/2012	75	17276	989	230	63%
	2012/2013	75	16764	987	224	62%
	2013/2014	74	16268	1007	220	60%
	2014/2015	74	15799	1008	214	58%
Projected	2015/2016		15853	991		
Projected	2016/2017		15855	991		
Projected	2017/2018		15729	983		

Secondary	School-year	Number of schools	Number of students	Number of teachers	Average school size	%-age usage of capacity
	2010/2011	24	15255	963	636	94%
	2011/2012	24	14381	968	599	89%
	2012/2013	24	13706	982	571	85%
	2013/2014	24	13212	1009	551	82%
	2014/2015	23	12861	1023	559	80%
Projected	2015/2016		12321	948		
Projected	2016/2017		12004	923		
Projected	2017/2018		11581	891		

Table 2: Basic data on primary and secondary schools

Further, 35 % of the primary students are enrolled in the ten biggest primary schools comprising 14 % of all primary schools, and 55 % of the secondary students are enrolled the ten biggest secondary schools comprising 43 % of all secondary schools.

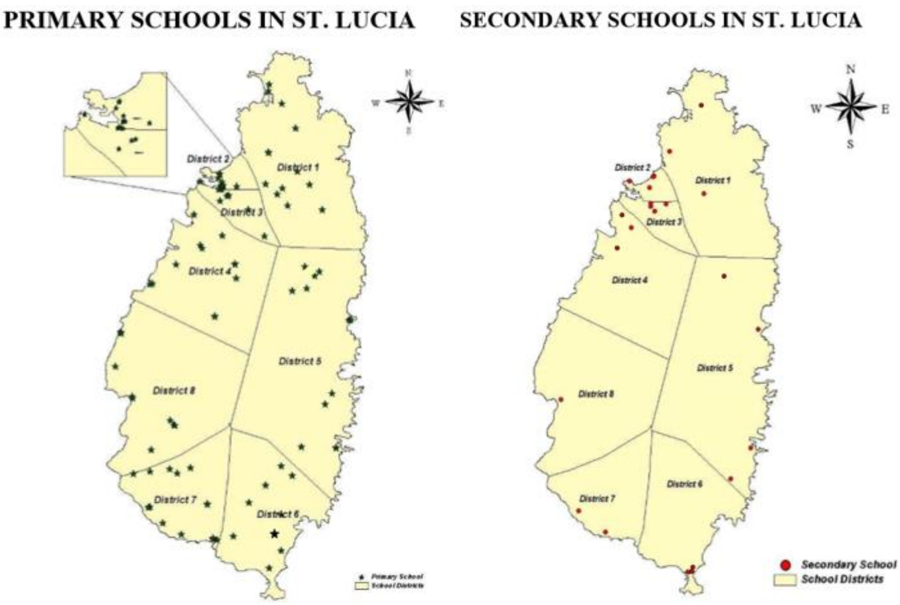

Figure 6: Location of Primary and Secondary Schools in Saint Lucia

Projections of school enrolment show a continuing decrease with approximately 1-2 % per year in primary school enrolment and 2-3 % per year in secondary, which is based on reduced birth rates.[6]

3.4 BUILDING SECTOR

Saint Lucia adopted building codes in 2001 and seven electrical and lighting codes between 2002 and 2008 designed to improve end-use efficiency on the island. Not all of these standards are mandatory, and the degree to which they are enforced or updated is unknown (Laboratory, 2015).

In 2015, OECS published the 6th revision of the OECS Building Code (OECS, 2015), originally from 1992, based on the desire of four governments (Saint Lucia, Saint Vincent and the Grenadines, Grenada and Montserrat) to improve the regulations. The revision of the code is more responsive to the current needs of these countries and aims at reducing the vulnerability of buildings to natural hazards. Currently, administrative provisions for the code are updated in Saint Lucia and the code is expected to be in force in 2018.[7]

3.5 ENERGY CONSUMPTION IN SCHOOLS

Energy is consumed in schools in Saint Lucia for various purposes, the following table gives an overview on the type of consumption and the energy sources used:

Type of consumption	Energy source used	Comment
Lighting	Electricity	Both indoor and outdoor lighting
Ventilation	Electricity	Ceiling fans and standing fans
AC	Electricity	Mainly in principal's office and computer rooms
Office equipment (computer, printer, projector)	Electricity	Various consumers
Cooling equipment (fridge, freezer, water cooler)	Electricity	Various consumers
Hot water	Solar	Mainly using solar hot water panels
Cooking	LPG	School feeding programs in most primary schools, in some secondary schools

Table 3: Type of energy consumption and energy sources used in schools

To calculate the energy consumption of primary and secondary schools in Saint Lucia, extensive data collection activities were started. Questionnaires were sent to schools to investigate the electrical inventory in each school (number of indoor lights, outdoor lights, ACs, etc.). Additionally, electricity consumption for each school was collected by checking electricity bills (covering 8 months, April to November 2016). Electricity consumption data was delivered for 93% of all primary schools and 85% of all secondary schools.

As there was no information on the share of each type of consumption (lighting, ventilation, office equipment, etc.), the Project Team modelled the electricity consumption for those schools, where consistent data and full data sets were existing. In the modelling process, a number of assumptions were made, such as average operation hours for each type of consumption, installed capacities, number of operation hours per day or number of days of operation.

[6] http://www.ifs.du.edu/ifs/frm_CountryProfile.aspx?Country=LC

[7] Information from OECS Commission and Renewable Energy Division.

A number of schools could not be analyzed for various reasons, such as missing consumption data, missing inventory, inconsistent data or number of pupils not known. These schools were removed from the set of data to be analyzed. For primary schools, the sample size covered 21% of all pupils, for secondary schools, the sample size was 19%.

To calculate energy consumption for cooking, data from 6 primary schools was received. As there are no meters for LPG, consumption was estimated (e.g. “2 x 20lb LPG tanks a month”). The information received was used to calculate an approximate LPG consumption per pupil.

There is no clear information on which schools on primary and secondary level provide school feeding programs. It was indicated that school feeding programs are existing in most primary schools, whereas most secondary schools don’t have a school feeding program. It was estimated that 90% of primary schools and 20% of secondary schools provide a feeding program.

Hot water preparation is mainly done by solar hot water panels, in some cases with electricity. As consumption of hot water is reported to be low and there was not sufficient data on hot water consumption, hot water preparation is not included in the overall figures.

Based on these assumptions and information, the energy consumption in schools was calculated, which gave the following results:

	Primary schools	Secondary schools
Total energy consumption in MWh	1,500.2	1,433.1
Electricity consumption per student in kWh	77.8	107.6

Table 4: Total energy consumption in primary and secondary schools

Total energy consumption in primary and secondary schools in 2016 was 2,933.3 MWh, with primary schools having a share of 51.1 per cent and secondary schools of 48.9 per cent. Electricity consumption per student in secondary schools is almost 40 per cent higher than in primary schools.

The following graph shows the share of each type of consumption both in primary and secondary schools.

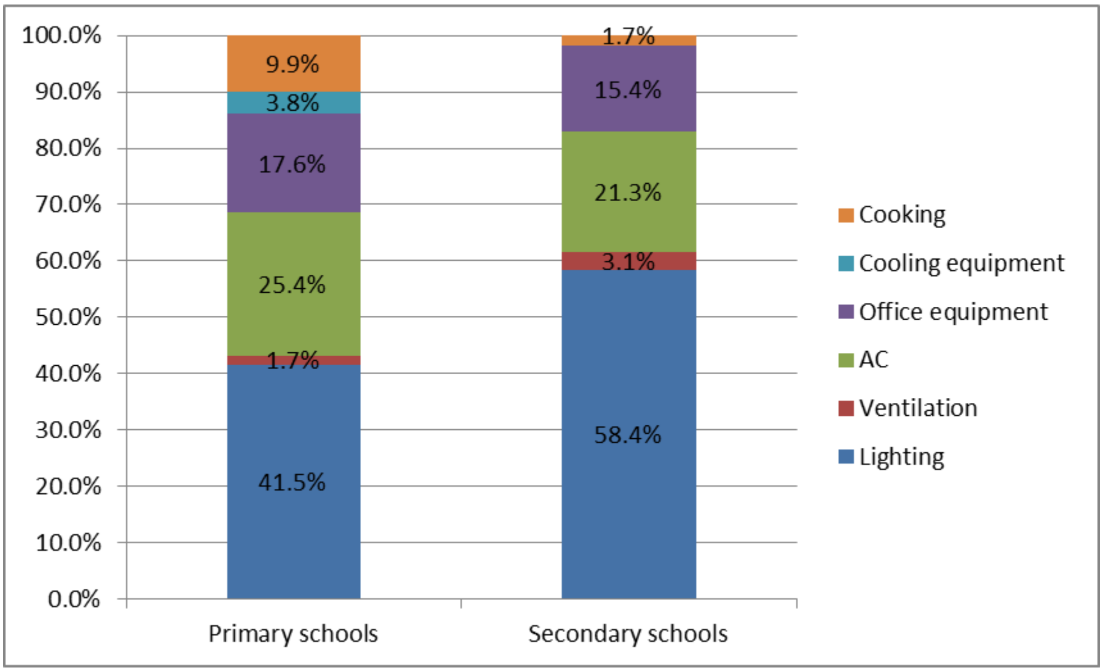

Figure 7: Share of type of consumption in primary and secondary schools

Lighting is the dominant type of consumption in both school types with 41.5 per cent in primary and even 58.4 per cent in secondary schools. Consumption for air conditioning and office equipment is similar in both school types. Ventilation, cooling and cooking only have small shares in total energy consumption (there is no cooling equipment in secondary schools).

3.6 EXISTING AND PLANNED ENERGY EFFICIENCY AND SOLAR PV PROJECTS IN SCHOOLS

The data collection on schools described in the previous chapter gave a good overview on the status of implementation of energy efficiency measures. The survey covered around 6,500 indoor lights in schools. Out of this total number, only 73 or 1.1 per cent were LED lamps, the rest was fluorescent tubes (4 feet tubes). This shows that currently there is only a negligible share of energy efficient lighting installed in schools.

In regards to solar PV, there are only 2 installations reported: a 4 kWp system at Vieux Fort Comprehensive and a 2 kWp system at Saint Mary's College.[8]

However, there are extensive plans to install additional solar PV units in schools. The following table summarizes these plans.[9]

Programme	Schools	Planned installed capacity	Planned completion	Estimated costs
Sustainable Energy: From Concept to Action	Sir Arthur Lewis Community College, Gros Islet Secondary School	2 x 25 kWp	January 2018	USD 55,000 per installation
J-CCCP Green Architecture	VF Comprehensive Secondary School, Des Barras Primary	1 x 25kWp 1 x 7 kWp 1 x 6kWp	November 2018	USD 169,000 (including batteries)

[8] Information from Renewable Energy Division by email.

[9] Information from Renewable Energy Division by email.

promotion pilot project	School, Forestiere Primary School			

Table 5: Planned solar PV units in schools

Besides these planned investments into solar PV units, there are a number of maintenance activities planned in several schools. This work includes for example electrical works, repair/replacing of roofs and walls or repair of windows. No official information on this planned maintenance work was shared.

4 POLICY ENVIRONMENT

4.1 ENERGY POLICIES

Saint Lucia National Energy Policy (NEP)

The Saint Lucia National Energy Policy (GoSLU, 2010) was published in 2010 and is the main guidance document for the energy policy of the country. Relevant for the Green Schools NAMA are the recommendations on the use of renewable energies.

The NEP defines renewable energy targets of 15 per cent in 2015 and 30 per cent in 2020. This should be achieved by using wind power, biomass, solar thermal, photovoltaic, hydropower and geothermal energy as energy sources.

There are specific rules for grid-connected small-scale renewable electricity systems with a maximum peak capacity of 5 kW[10]. These systems only need an approval from LUCELEC and the NURC. The Regulatory Commission, in collaboration with LUCELEC and other stakeholders, will constantly monitor and evaluate the economic and technical effects of self-supply systems. Net-metering will be allowed by the legislation, which means that electricity consumed from the grid and delivered to the grid have the same economic value.

National Issues Report on Key Sector of Energy (Mitigation) For Saint Lucia

The National Issues Report on Energy (Tulsie, 2010) was prepared by UNDP and gives a number of recommendations on the energy sector. In addition to recommending the use of renewable energies (mainly solar, wind and geothermal) and improving energy efficiency, the report also recommends a number of organisational changes (assignment of responsibility for energy planning and public utilities, establishment of an Energy Policy Advisory Committee, etc.).

Barbados Declaration on Achieving Sustainable Energy for All in Small Island Developing States (SIDS)

The Barbados Declaration (SE4ALL, 2012) was signed in 2012 by a number of SIDS, including Saint Lucia. In the declaration, the country made the following voluntary commitments:
Increase the contribution of renewable energy to the national energy supply by 20% by 2020 and support the development of indigenous energy sources.

1. To promote energy efficiency at all levels and in all sectors at the national level.
2. To reduce the consumption of electricity in the public sector by 20% by 2020.
3. To strengthen the institutional and legal framework for sustainable energy.
4. To develop and implement standards and guidelines for energy efficient products.
5. To develop and establish a suite of fiscal measures and a financing mechanism for greater penetration of sustainable energy technologies and products.
6. To facilitate capacity-building, innovation, research and development for sustainable energy.
7. To implement a comprehensive sustainable energy education and awareness programme.
8. To provide an enabling environment for sustainable energy that simultaneously allows the private sector to generate business opportunities that are consistent with the Green Economy Concept.

Relevant for the Green Schools NAMA is specifically the commitments to reduce the consumption of electricity in the public sector by 20% by 2020.

[10] http://nurc.org.lc/wp-content/uploads/2017/11/Application-Procedure-for-Solar-PV-Generation.pdf

Caribbean Renewable Energy Development Programme (CREDP)

CREDP prepared a review of grid-connected renewables in the Caribbean, also covering Saint Lucia (CREDP, 2013). Public electricity in Saint Lucia is supplied by the St. Lucia Electricity Services Ltd. (LUCELEC). In 2011, 100% of electricity generated (371 GWh) came from imported diesel fuels, there was no sizeable generation of electricity based on renewables. The report mentions solar PV with a total peak of 61 kW installed in 2011. The conclusion in the report is that Saint Lucia has lagged behind in its exploitation of its ample renewables potential.

OECS Building Code

In 2015, OECS published the 6th revision of the OECS Building Code (OECS, 2015), originally from 1992, based on the desire of four governments (Saint Lucia, Saint Vincent and the Grenadines, Grenada and Montserrat) to improve the regulations. The revision of the code is more responsive to the current needs of these countries and aims at reducing the vulnerability of buildings to natural hazards. Currently, administrative provisions for the code are updated in Saint Lucia and the code is expected to be in force in 2018.[11]

As the building code is focused on the prevention of natural hazards, energy efficiency and renewable energy only play a minor role in the code. In sections 502 and 618, the code calls for properly sealed and insulated buildings in case of air-conditioning (e.g. defining maximum U-factors for walls, windows and roofs) and a maximisation of the use of renewable energies. For air conditioning, a number of requirements are mentioned in section 1102 (e.g. a design temperature of 75°F/24°C).

4.2 CLIMATE CHANGE POLICIES

Second National Communication on Climate Change (SNC)

The Second National Communication on Climate Change (GoSLU, 2011) was finalised in 2011 and submitted to UNFCCC on 19 April 2012. It reports on the GHG emissions and removals by sinks in the years 2000 and compares these figures with data from 1994, which was used for the First National Communication. It also includes a Mitigation Assessment (MA) to evaluate the potential impacts of various technologies and practices which can mitigate climate change, while also supporting sustainable development in Saint Lucia. The assessment included the development of a baseline scenario in which the assumption is made that GHG emissions will continue in the absence of any additional mitigation measures. In a second step, two scenarios were developed where GHG emissions were projected assuming additional defined emission reduction measures. Both Baseline and Mitigation Scenarios considered the period to 2020 and were prepared utilising the Long-range Energy Alternatives Planning system (LEAP) Model.

Two mitigation scenarios were developed (Mitigation Scenario #1 and Mitigation Scenario #2), each including a number of measures. For the Green School NAMA, the following mitigation actions are relevant:

- Measure #8: Auto-generation and co-generation (Scenario #1);
- Measure #10: Improved energy efficient appliances and lighting through the use of standards (Scenario #1);

[11] Information from OECS Commission and Renewable Energy Division.

- Measure #11: EE Building Code (strengthen energy efficiency in the Building Code, Scenario #1);
- Measure #18: Demand-side management (DSM) program for electricity (Scenario #2).

Overall baseline emissions are expected to rise from 579,000 tons in 2000 to 813,400 tons in 2020. In Scenario #1, GHG emissions will be reduced by 19.6 per cent to 654,100 tons, Scenario #2 generates a 25.7 per cent GHG emission reduction relative to the Baseline Scenario (604,300 tons vs. 813,400 tons).

Nationally Determined Contribution (NDC)

The NDC of Saint Lucia was submitted to the UNFCCC on 22 April 2016.[12] In this document, the country confirms a conditional target of a GHG emission reduction of 16 per cent by 2025 compared to its business as usual (BAU) scenario and a reduction of 23 per cent by 2030. In absolute figures, the emission reduction is estimated at 188,000 tons by 2030. There is no unconditional target mentioned in the NDC.

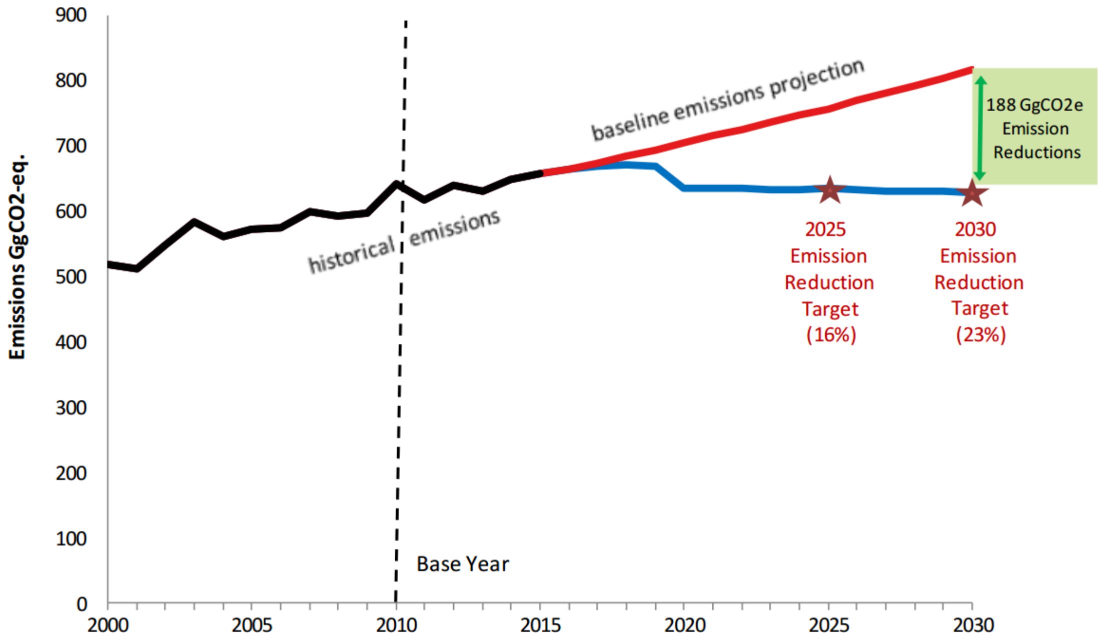

Figure 8: Graphical representation of NDC

For the Green Schools NAMA, actions in the field of energy efficiency and renewable energies are relevant. The NDC mentions under proposed interventions energy efficient buildings, energy efficient appliances and electricity generation (with a 35 per cent renewable energy target by 2025 and 50 per cent by 2030 based on a mix of geothermal, wind and solar energy sources), all are conditional upon availability of financing.

The NDC also lists key national policies, legislation and actions that address climate change mitigation and adaptation. The key documents relevant for the Green School NAMA are also analysed in this chapter.

Third National Communication (TNC)

[12] The NDC submitted in 2016 and the INDC communicated in 2015 are identical documents, the document is still called "Saint Lucia's INDC" on UNFCCC's NDC Registry page.

The Third National Communication (TNC) was submitted to the UNFCCC on 13 September 2017 (GoSLU, 2017). It describes in detail the national circumstances, provides a new GHG inventory, describes mitigation and adaptation measures and describes constraints and gaps to the achievement of objectives of the UNFCCC.

The GHG inventory shows a level of total GHG emissions in 2010 (excluding LULUCF) of 647,000 tons, which is an increase of 31 per cent compared to 2000. Emission growth is primarily driven by the growth in energy emissions related to increased demand for fossil fuels (energy industries and road transport).

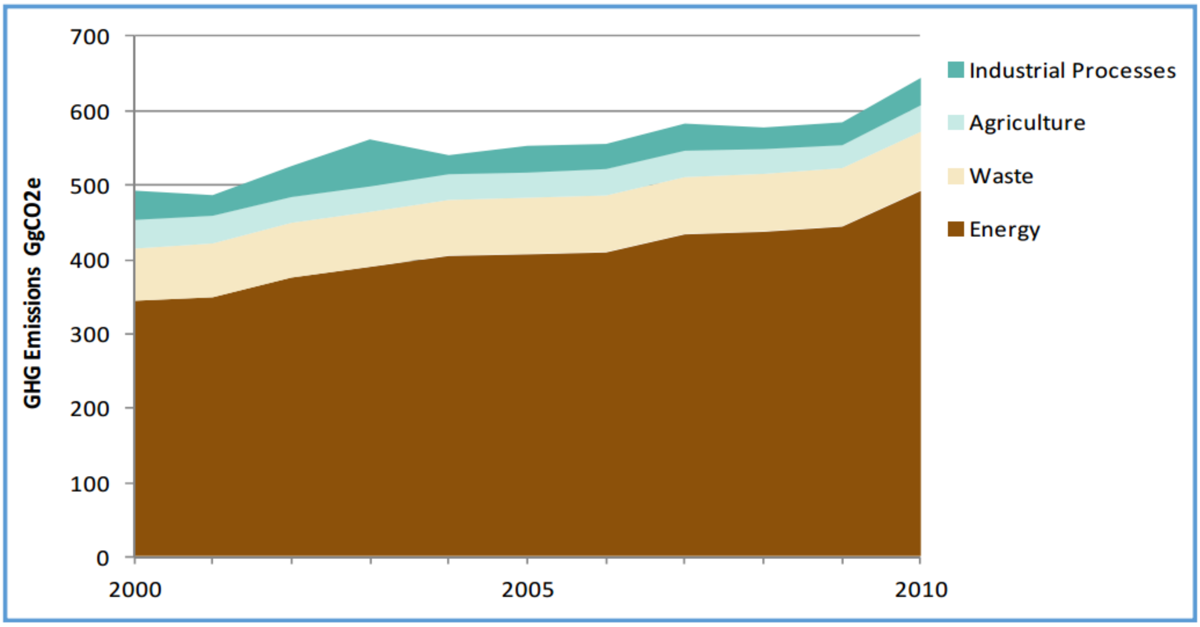

Figure 9: GHG emissions 2000-2010 (excluding LULUCF)

The GHG emission baseline projection shows an increase from 643,000 tons in 2010 to 816,000 tons in 2030 (an increase of 27 per cent). The increase is mainly driven by the transport sector and electricity generation.

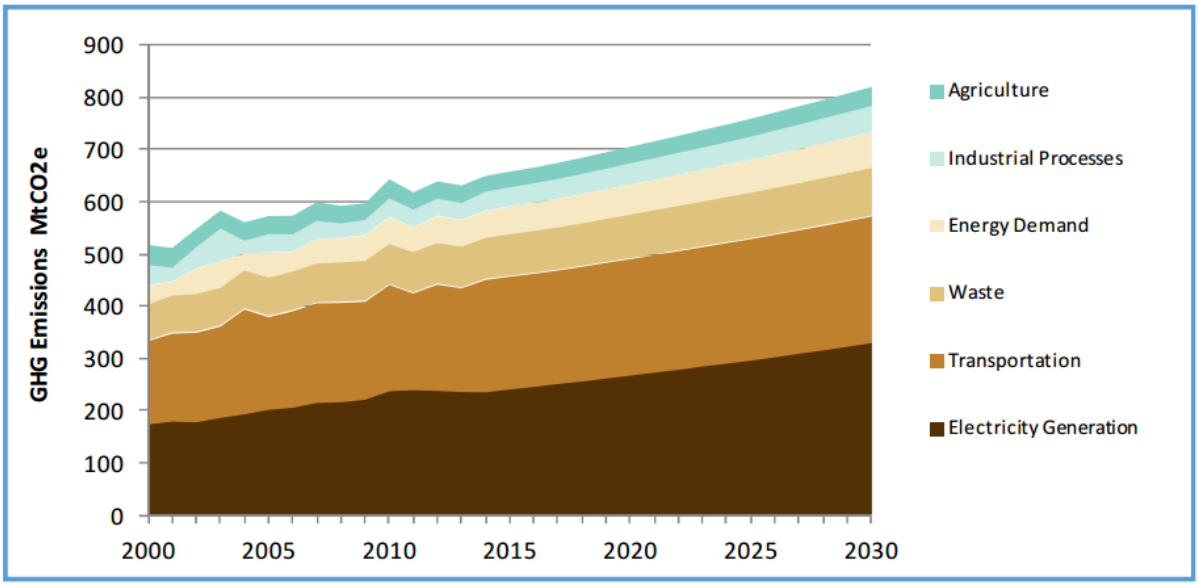

Figure 10: GHG emission baseline projection

The TNC also includes mitigation assessments for all major sectors (energy demand, electricity, transport, industrial processes, agriculture, etc.). Relevant for the NAMA are the sections on energy demand as well as on renewable energy. In the energy demand section, the electricity consumption of government buildings is expected to increase from 12,506 MWh in 2017 to 15,425 MWh in 2030, an increase of 23 per cent (1.6 per cent per annum). The paper projects a reduction in energy consumption compared to the baseline through improvements in the building code, which would impact new buildings to be built, of 5.1 per cent until 2030. Energy efficiency measures in existing buildings would lead to reductions compared to the baseline of 1.9 per cent. In total, consumption in government buildings is expected to be 7 per cent lower in 2030 compared to the baseline.

In the renewable energy sector, distributed solar PV is most relevant for the Green School NAMA. The projected generation capacity to be installed until 2030 varies between 3 MW (scenario 2) and 6 MW (scenario 1).

4.3 EDUCATION SECTOR RELATED POLICIES

National Environmental Education Strategy for Saint Lucia 2012 – 2017

This strategy (GoSLU, 2012) is intended to facilitate the operationalisation of the National Environmental Education Policy by government agencies, private sector organisations, education institutions and communities. Its target is as follows:
"*All Saint Lucians should be equipped with the knowledge and skills required to contribute meaningfully to sound environmental management and the sustainable development of Saint Lucia.*"

Environmental education addresses three programme areas:
1) an enabling environment for environmental education;
2) the formal and informal education system; and
3) public awareness and training.

Figure 11: Goals of the National Environmental Education Strategy

4.4 KEY STAKEHOLDERS RELEVANT TO THE NAMA

There are a number of stakeholders in Saint Lucia relevant to this NAMA. These are the following institutions:

- Sustainable Development & Environment Division under the Ministry of Education, Innovation, Gender Relations and Sustainable Development: is responsible for sustainable development and environmental policies in Saint Lucia and chairs the National Climate Change Committee (NCCC).
- Renewable Energy Division under the Department of Infrastructure, Ports and Energy is responsible for energy planning and development of energy policies and renewable energy projects in Saint Lucia.
- Department of Education under the Ministry of Education, Innovation, Gender Relations and Sustainable Development: is responsible for the operation of schools and as such also responsible for the energy consumption in schools. Their maintenance division is responsible for all maintenance aspects of schools and all major rehabilitation works.
- National Climate Change Committee (NCCC): consists of key stakeholders working on climate change and develops national climate change action plans and mitigation strategies and initiates education, training and public awareness campaigns designed to engage the general populace on the problem of climate change.
- LUCELEC: is the national electricity provider and responsible for generating electricity on the country and supplying it to its customers. LUCELEC is a public company, the government (12.4 per cent) and Castries City Council (16.3 per cent) only hold minority shares.[13]

4.5 KEY BARRIERS IDENTIFIED

There are a number of key barriers for an improved application of energy efficiency and renewable energy technologies in Saint Lucian schools. These barriers were identified in several documents (including (Stiebert, 2015), (GoSLU, 2011) as well as in individual stakeholder meetings during the preparation of this NAMA document.

- Technical barriers: although there are a wide range of technically mature GHG reduction options available, some of these have not been demonstrated at a scale suitable for Saint Lucia. The professional and technical skills required for some of these technologies are also not readily available or may require infrastructure or other support that does not exist. LED lamps for example are a technically mature technology with good pay back periods, still, only 1.1 per cent of lights installed in schools in Saint Lucia use this technology.
- Technical capacity: due to low levels of installation of energy efficiency and renewable energy technologies, there is a lack of capacity for installations, operation and maintenance. There are only a few companies in the country, which have specific experience.
- Political barrier: certain measures have been discussed for some time, still, implementation is lagging behind. One example relevant for the Green Schools NAMA is improved building codes, which have been elaborated but haven’t been approved yet and are therefore not implemented.

[13] http://www.lucelec.com/content/brief-history-lucelec

- Financial barrier: in the education sector, the Government is focusing on improving the infrastructure for example by repairing roofs and walls, replacing windows or improving electrical works. This leaves little room for additional investments into energy efficient equipment or renewable energies.
- Costs of technical solutions: as Saint Lucia is an island and a small market, technical solutions have higher costs per unit than in other countries. Costs of small scale solar PV units for example have dropped in Europe during the last 5 years by about 40% and are now at a level of around USD 11,000 for 5 kWp, whereas such a unit would cost around USD 17,500 in Saint Lucia.[14]
- Lack of information on energy consumption: Invoices for electricity consumption are received from LUCELEC (these include electricity consumption and charges to be paid), but there is no system to collect information on electricity consumption in schools. As this information is missing, there is no possibility to trail consumption or investigate the reasons for increases/decreases in certain months. Information on consumption of LPG is not available either; schools can only give a rough overview on the number of tanks purchased per month.

[14] Information from EcoCarib and Renewable Energy Division by email.

5 NAMA BASELINE AND NAMA TARGETS

5.1 NAMA BOUNDARY

The NAMA boundary was discussed and approved in the first stakeholder workshop as follows:

- The NAMA covers the entire country.
- The NAMA covers all schools in primary and secondary education.
- The NAMA covers all GHG emission related activities in school buildings (such as lighting, air conditioning or cooking).
- The NAMA covers renewable energy generation on school sites.

The following aspects will not be included in the scope of the NAMA:

- Transport of pupils to and from schools.
- Post-secondary and tertiary education.
- Improvements in electricity generation and transport.
- In the NAMA training workshop in June 2016 it was suggested that rainwater harvesting and grey water recycling should be included in the scope of the NAMA. However, the NAMA stakeholders agreed that this component should be excluded from the NAMA, as it is an adaptation and not a mitigation measure.

The following figure summarizes the boundary of the NAMA.

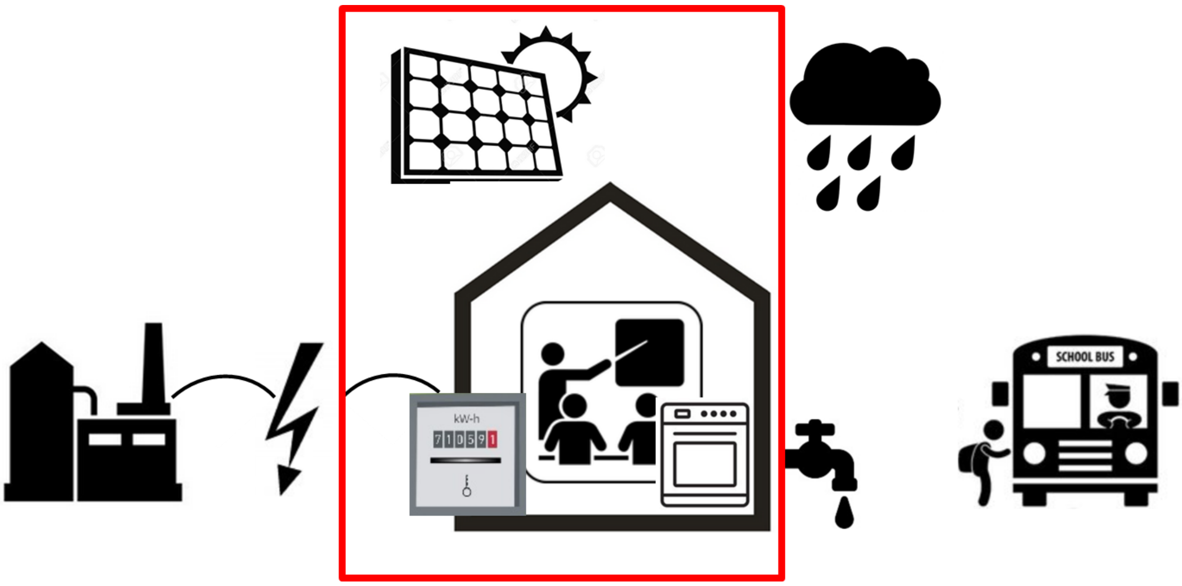

Figure 12: NAMA Scope

5.2 GHG EMISSIONS BASELINE

To compare GHG emission reductions generated under this NAMA, a baseline needs to be developed, which projects current energy consumption and related GHG emissions into the future. It is important that this projection reflects only existing policies, regulations and financial commitments and does not account for potential new policies or account for financing that is speculative in nature. For this reason, targets and goals expressed by the Government of Saint Lucia are not considered as constituting the baseline, unless appropriate policies have been put in place and funds have been committed to achieve them.

To calculate electricity consumption in the baseline, the following data sets and assumptions are used:

- Electricity consumption in government buildings: for all government buildings, electricity consumption is expected to increase by 23 per cent between 2017 and 2030 (Stiebert, 2015). An increase in electricity consumption in schools can be expected as well as service levels (more computers, increase AC demand, etc.) will increase, therefore this figure will be applied.
- Number of students: what needs to be considered additionally is that numbers of students have been decreasing in recent years (both primary and secondary) due to lower birth rates and are expected to further decrease in secondary schools and stay constant in primary schools. The following trends will be used for the baseline projection:
  - Up to 2018, projections of student numbers from the statistical digest are taken as a basis (GoSLU, 2015).
  - Between 2018 and 2030, the trend of population aged 15 or less is taken as the indicator.[15] The trend shows a slight decrease from 33,000 in 2019 to 32,000 in 2030.

To project the consumption of LPG for cooking, the current consumption is put in relation to number of students in the years 2017 to 2030.

The figure below shows the baseline development of energy consumption in schools in Saint Lucia. In the baseline, energy consumption will increase from 2,933 MWh in 2016 to 3,190 MWh in 2025, which is an increase of 8.8 per cent.

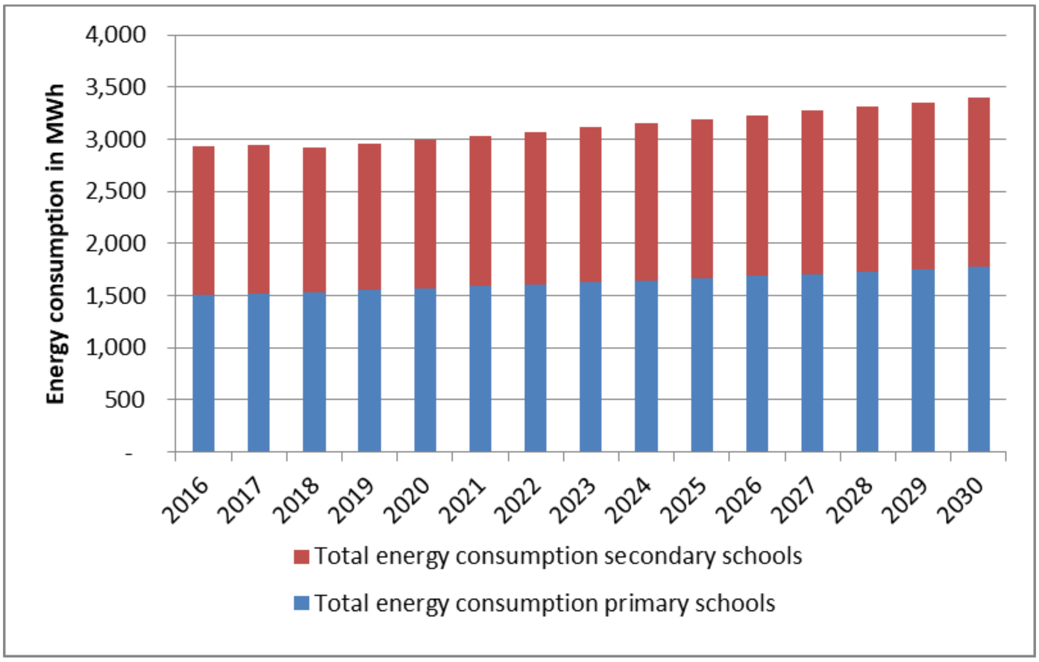

Figure 13: Total energy consumption in primary and secondary schools, 2016-2030

For the calculation of GHG emissions from electricity, the Grid Emission Factor (GEF) developed by UNFCCC under the Standardized Baseline (SB) will be applied. The SB is awaiting UNFCCC approval. The factor will be applicable for all electricity grid-related projects in Saint Lucia and will be valid until 2020. The factor is 0.664 tCO2 per MWh of electricity and is applicable for the first, second and third crediting

[15] http://www.ifs.du.edu/ifs/frm_CountryProfile.aspx?Country=LC

period of any project. Therefore the GEF will be applied for the calculations under the NAMA. For the emissions from cooking, the relevant IPCC factor for LPG is applied.[16]

The figure below shows the baseline development of GHG emissions in schools in Saint Lucia. GHG emissions of the schools covered by the NAMA will increase from 1,884 tons in 2016 to 2,057 tons in 2025, an increase of 9.2 per cent.

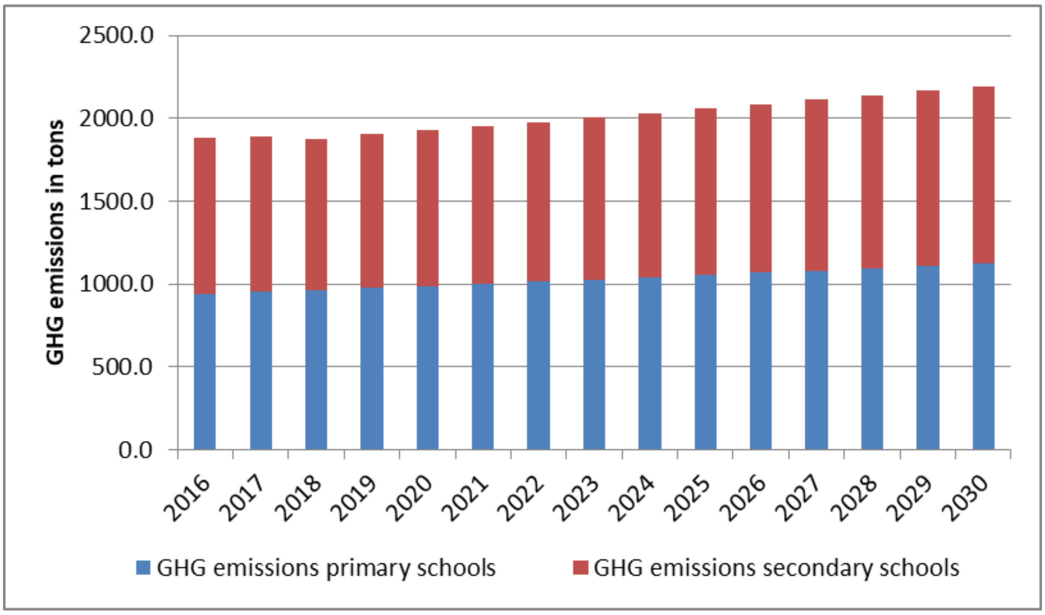

Figure 14: Total GHG emissions in primary and secondary schools, 2016-2030

5.3 SUSTAINABLE DEVELOPMENT BASELINE

For the purpose of monitoring the NAMA's impact on sustainable development, the baseline is quantified using selected indicators in the areas relevant to the NAMA. The Sustainable Development (SD) indicators were identified using UNDP's Climate Action Impact Tool.[17] The tool helps to identify significant impacts, define indicators, quantify impacts and set targets and track the progress of actions. The tool is a bottom-up tool that can be applied to track 'significant, direct impacts' of actions.

The SD indicators to be applied in the Green Schools NAMA were discussed during the first stakeholder workshop in February 2017. A total of six indicators were considered as very relevant for the NAMA by the participants. These indicators are listed in the table below.

Domain	Indicator	Parameter
Growth and Development	Capacity building and education	No. of persons in capacity building programme
	Access to clean and sustainable energy	No. of solar PV units installed
	Access to sustainable technology	No. of schools with energy efficiency measures carried out
	Energy security	No. of solar PV units installed
Economic	Job creation	No. of permanent jobs created through interventions

[16] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf

[17] https://climateimpact.undp.org

Institutional	Policy and planning	NAMA Coordinating and implementing entities established and operational

Table 6: Sustainable Development (SD) Indicators monitored

5.4 NAMA TARGETS

The NAMA targets were discussed during the first stakeholder consultation and agreed among stakeholders. The following **targets** were defined under the Green Schools NAMA (all targets are based on the activities covered in the NAMA boundary):

- **Reduction of energy consumption of 20% by 2025** (this is based on the 20% target for the public sector defined in the Barbados Declaration on Achieving Sustainable Energy for All in Small Island Developing States (SIDS))
- **Reduction of GHG emissions of 35% by 2025** (overshooting the target of 16% by 2025 defined in the NDC).

For the chosen SD indicators, the following targets are set:

Indicator	Parameter	Target value (estimated ex-ante)
Capacity building and education	No. of persons in capacity building programme	50 experts 15,000 pupils
Access to clean and sustainable energy	No. of solar PV units installed	40
Access to sustainable technology	No. of schools with energy efficiency measures carried out	95
Energy security	No. of solar PV units installed	40
Job creation	No. of permanent jobs created through interventions	20
Policy and planning	NAMA Implementing structure established within 6 months after finalisation of NAMA document • NAMA Coordinating Authority • NAMA Implementing Entity	 1 1

Table 7: Indicators for SD targets

Based on the SD indicators identified and the target values, the contribution to the 17 SDGs was analysed by using UNDP's Climate Action Impact Tool. The following figures show that the NAMA is contributing to achieving the following SDGs:

- SDG 7 – Affordable and clean energy
- SDG 8 – Decent work and economic growth
- SDG 9 – Industry, innovation and infrastructure
- SDG 13 – Climate action
- SDG 17 – Partnerships for the Goals

Figure 15: Contributions to SDGs

5.5 ALIGNMENT OF THE NAMA OBJECTIVES WITH NATIONAL STRATEGIES AND TRANSFORMATIVE CHANGE

Transformative change is a key concept, which needs to be included in each NAMA. The aim is to not only focus on implementing actions, which are leading to lower GHG emissions and contribution to Sustainable Development benefits, but in addition, transform the sector the NAMA is embedded in. The solution proposed by this NAMA is designed with the aim of implementing activities for energy efficiency and renewable energy solutions in the education sector as follows:

- The interventions covered under this NAMA will support the achievement of targets set in Saint Lucia's NDC. Whereas the NDC defines a conditional target of 16 per cent GHG emission reduction by 2025 compared to the BAU, the NAMA will lead to a reduction of 35 per cent by 2025.
- The NDC mentions three main sectors, where activities are planned; energy demand, electricity generation and transport. Through its Interventions, the NAMA will contribute both to reduction of energy demand and increase of electricity generation with renewable energies.
- The interventions covered under this NAMA will cover all primary and secondary schools in Saint Lucia and will therefore lead to a complete improvement of all schools in the country in terms of energy efficiency and use of renewable energies.
- The GoSLU commits to implement energy efficiency measures and solar PV units when schools are extended or new schools are being built (these activities are not covered by the interventions of this NAMA), thereby implementing transformative change in an entire sector.
- The energy accounting system implemented under the capacity building component of this NAMA will capture information about energy consumption in schools. This will give government institutions as well as schools the possibility to analyse the effect of improvements and can help them understand impacts from consumer behaviour on energy consumption. By making this visible, awareness will be built up on various levels, which can extend to other sectors (e.g. students can understand impacts of energy efficiency measures and can apply what they have learnt at home).

- Education for pupils on sound environmental management and sustainable development will strengthen that effect and will help pupils get a thorough education on environmental topics, including energy.
- Training for companies and institutions will increase both the awareness about energy efficiency/renewable energy technologies and will help participants to look for similar opportunities in other sectors (other governmental buildings, companies, private housing, etc.)
- The creation of demand for energy efficiency measures and renewable energy solutions will have positive impacts on other sectors as well due to the increased awareness of government entities, companies and institutions. Activities implemented under this NAMA can also be implemented for example in other governmental buildings or in private sector companies.

The NAMA targets defined for the Green School NAMA contribute to various national strategies and targets. The table below gives an overview on how each target contributes national strategies.

NAMA objective	National strategy & target
Reduction of energy consumption	The NAMA objective to reduce energy consumption by 20% contributes to the target for the public sector defined in the Barbados Declaration. Whereas the target in the Barbados Declaration is to be achieved by 2020, the NAMA target is to achieve the reduction of 20% by 2025.
Reduction of GHG emissions	In the NDC, Saint Lucia confirms a conditional target of a GHG emission reduction of 16 per cent by 2025 compared to its business as usual (BAU) scenario. The NAMA target of 20% will over-achieve the NDC target.
Capacity building and education	This will contribute to the Barbados Declaration to facilitate capacity- building as well as to implement a comprehensive sustainable energy education and awareness programme.
Improve access to clean and sustainable energy	The National Energy Policy states that exploitation of indigenous renewable energy resources is one of the tenets of Saint Lucia's energy policy.
Improve access to sustainable technology	Sustainable technology is linked both to clean/sustainable energy and capacity building and is therefore contributing both to Barbados Declaration and the National Energy Policy.
Improve energy security	The National Energy Policy states that energy security and reliability are one of the tenets of Saint Lucia's energy policy.
Creation of additional jobs	Creation of additional jobs is not specifically mentioned in energy related national strategies but in general contributes to the objective to create new job opportunities in the country.
Improve policy and planning	This will contribute to the Barbados Declaration to strengthen the institutional and legal framework for sustainable energy.

Table 8: Alignment of NAMA objectives with national strategies

6 NAMA INTERVENTIONS

NAMA interventions are the core physical, technical activities to be realized on the ground, and bring about the major part of the emission reduction and expected SD benefits. The proposed interventions are directly aligned to the targets of the NAMA stated chapter 5.4.

The NAMA includes the following interventions:

- Intervention 1: Energy efficiency
- Intervention 2: Renewable energy
- Intervention 3: Training and capacity building

6.1 INTERVENTION 1: ENERGY EFFICIENCY

As shown in chapter 3.5, the majority of energy consumption is used for lighting purposes in schools. In primary schools, 41.9 per cent of total energy consumption is used for lighting, in secondary schools the share is even 58.5%. Therefore, intervention 1 will focus on improving the energy efficiency of lighting in all schools in Saint Lucia.

In the primary and secondary schools covered by the inventory of electric appliances prepared under this NAMA, around 6,500 indoor lights are currently installed. Extrapolating that figure to all schools in Saint Lucia, the estimated number of total indoor lights is 13,800. Adding outdoor lights, the total number increases to around 15,000 lights.

The indoor lights used in Saint Lucian schools are predominantly fluorescent tubes with a length of 4 feet and a capacity of 40 Watts. Each light consists of a casing, the fluorescent tube (length of 4 feet), a ballast and a starter. The ballast is necessary for fluorescent tube lights to regulate the current delivered and to provide sufficient voltage to start the lamps, the starter is helping the lamp light. The figure below shows a typical connection scheme of a fluorescent light.

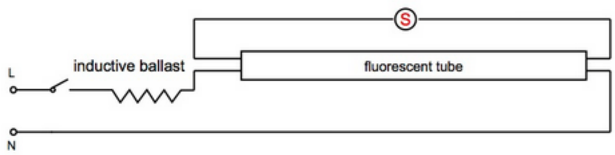

Figure 16: Typical connection scheme of a fluorescent light
Source: http://www.tforceled.co.uk

Fluorescent lights can be replaced by energy efficient light tubes, such as LED tubes. These have a number of benefits:

- Reduction in energy consumption, usually 40 Watt fluorescent tubes are replaced by 18-20 Watt LED tubes.
- No ballast necessary, therefore further reduction of energy losses.
- Longer lifetime than fluorescent tubes.
- Less heat production, resulting in less need for ventilation or air conditioning.
- LED is a directional light source, whereas fluorescent lights emit light in all directions.

The following pictures show examples of LED tubes:

The energy efficient light tubes must have the following characteristics:

Parameter/criterion:	**Value:**	**Assessed:**
Light tube	Technology: LED Maximum capacity: 20W Minimum luminosity: 2,300 lm Luminous colour: between 2,700 and 3,500 K Size: T8 No ballast	Protocol at implementation
Ballast and starter	Need to be removed or deactivated	Protocol at implementation
Installation	Accredited electrician	Check of references when tendering work
Lifetime	Minimum 3 years warranty, ideally 5 years	Provided during installation, Saint Lucian Bureau of Standards will check quality of tubes
Disposal of existing fluorescent tubes	According to waste disposal legislation	Confirmation of proper disposal

Table 9: Parameters/criterion under Intervention 1

Within the NAMA, all fluorescent tubes will be replaced with LED tubes. The number of fluorescent tubes installed in primary and secondary schools in Saint Lucia was estimated at 15,000 tubes (based on the inventory of electrical installations developed for this NAMA and extrapolation to all schools in the country). The NAMA aims at replacing 13,500 tubes (replacing 100 per cent of tubes is considered as not realistic as there will be a limited number of non-functioning lights). The replacement of one fluorescent tube by an LED tube leads to the following savings in electricity consumption and GHG emissions per annum:

	Fluorescent tube	LED tube
Installed capacity (Watts)	40	18
Operation hours per day	9	9
School days per year	201	201
Energy consumption (kWh)	72.4	32.6
Savings (kWh)		**39.8**
Savings (kg CO2)		**26.4**

Table 10: Savings in electricity consumption and GHG emissions per lamp

Intervention 1 will be implemented over 2 years, whereas in the first year 60 per cent of lamps will be reduced, the remaining 40 per cent in year 2. The following table shows the implementation schedule of Intervention 1.

Year	No of lamps replaced	MWh reduced	GHG reduced
Year 1	8,100 (60%)	322.36	214.0
Year 2	5,400 (40%)	537.27	356.8

Table 11: Implementation schedule of Intervention 1

In total, with 13,500 lamps being replaced, Intervention 1 will lead to savings in electricity consumption of 537.3 MWh and CO_2 emission reductions of 356.8 tons per year (applying the Grid Emission Factor of 0.664 tCO_2/MWh). Compared to the baseline figure in 2025, this is a reduction in energy consumption of 16.8 per cent and a reduction in GHG emissions of 17.3 per cent.

The reduction in energy consumption of 16.8 per cent is based on the stock of lamps in 2016. As the baseline calculations show, electricity consumption is growing and in 2025 the additional consumption of lighting will be 133 MWh. As this additional need for lighting will be covered with LED lights, additional 73 MWh of electricity can be saved. This brings total electricity savings in 2025 to 610 MWh, which is a reduction of 19.1 per cent. This is very close to the target of 20 per cent and it can be expected that the difference is closed by behavioral changes (e.g. switching off lights when sufficient outside light, switching off AC when rooms not used, etc.) due to the capacity building efforts (Intervention 3).

Inclusion of further energy efficiency measures

The NAMA currently focuses on improving the efficiency of lighting, as this measure has the highest potential. Other measures can be included in the NAMA at a later stage, such as:

- Installation of ACs with higher COPs (Coefficient of Performance)
- Installation of efficient ventilators
- Installation of sensors and timers
- Installation of office equipment meeting energy efficiency requirements (e.g. Energy Star)
- Installation of more efficient LPG cooking stoves

All these measures have two things in common: they tackle consumption types with relatively small shares in total energy consumption in schools and the efficiency potential of these measures is limited. As a conclusion, it will be difficult to prepare bundles of energy efficiency measures with substantial level of investment and mitigation effects. Therefore, to support the transformative approach of this NAMA, the GoSLU should include these additional energy efficiency measures whenever schools are being renovated or new schools are being constructed.

Outcomes of Intervention 1

The following table summarizes the outcomes of Intervention 1.

Outcomes of Intervention 1:	**Savings in electricity consumption**	**GHG emissions reduction per year**	**GHG emissions reduction per 15-years lifetime**
1 lamp	39.8 kWh	26.4 $kgCO_2$	0.396 tCO_2

13,500 lamps in all schools	537.3 MWh	356.8 tCO2	5,352 tCO2

Table 12: Outcomes of Intervention 1

6.2 INTERVENTION 2: SOLAR PV SYSTEMS

Intervention 2 covers the implementation of solar PV systems for power generation in primary and secondary schools. The objective is to cover electricity requirements of the schools such as lighting, air conditioning, ventilation, office equipment and cooling. It is not planned to install batteries for storage of electricity, as all solar PV units will be connected to the grid and excess electricity can be fed into the grid.

Solar PV units need to meet the following requirements:

Parameter/criterion:	Value:	Assessed:
PV panels	Monocrystalline, polycrystalline, or thin film	Protocol and pictures at implementation
Fixture/placement	Mounted on the roof or free standing	
	The school will have to ensure safety of the installed system – the school compound must be fenced, or the access to the panels must be restricted.	
Components	Inverters Wiring	
Additional equipment	Light bulbs (indoor)	
	Watch light (outdoor)	
Capacity/volume	Depending on the school size and type (see the estimation below)	Annual electricity bills
Installation	Company with experience in installation of solar PV units (at least 3 projects with total capacity of minimum 10 kWp)	Check of references when tendering work
Lifetime	15 years (with annual maintenance)	Operation monitored annually
	The warranty for the panels should be 5 years, for inverter 10 years.	
	The contractor should conduct user training and supply an illustrated user manual for each PV unit.	At commencement & up-date annually at the maintenance

Table 13: Parameters/criterion under Intervention 2

The National Utilities Regulatory Commission (NURC) has issued a temporary regulatory framework regulating the application procedure for solar PV generation.[18] The procedure is applicable for solar PV installations not exceeding 5kWp for residential usage and 25kWp for commercial usage (schools are considered under commercial usage). It requires application for the installation of a solar PV unit with NURC and receiving an approval by NURC after review of applications by LUCELEC. As the procedure limits the size of solar PV installations, the maximum size to be installed in schools will be 25kWp.

[18] Application Procedure for Solar PV Generation provided by NURC by email.

The current tariff system for solar PV is based on net-metering. Under net metering, a kWh consumed from the grid and a kWh fed into the grid have the same economic value. It is envisaged that the net-metering system will be replaced in the medium-term by a net billing system, where kWh consumed and kWh fed into the grid have different rates. Currently, there is no information available on the level of tariffs.[19]

This has impacts on the financial performance of solar PV installations. Under net metering, sizing of a solar PV unit is not critical, as any kWh produced has the same economic value as a kWh of avoided consumption from the grid. This is different under net billing. Any time the consumption of a school is lower than current generation by the solar PV unit, electricity will be fed into the grid and the price paid for this kWh is lower than the price of a kWh avoided consumption from the grid. Therefore, it is important to optimize the size of a solar PV unit.

On the other hand, there are certain economies of scale with the installation of larger solar PV units. There are fixed costs for designing and approval. For some components (e.g. inverter) prices don't increase proportionally to capacity and larger units can achieve bigger discounts.

The majority of electricity consumption in schools will be during day times (AC, computers, a good share of lighting,…), only a smaller share of electricity consumption will be during night times (fridges, lighting for evening lessons, outside lighting,…). For calculating installed capacities of solar PV units under this NAMA, the maximum size of solar PV units is set at 80% of the annual electricity consumption. It further needs to be considered that energy efficiency measures on lighting will be carried out in these schools. It is assumed that these energy efficiency measures lead to a 20% reduction in electricity consumption, this reduced consumption is the basis for designing the solar PV units.

In order to optimize total investment costs and to achieve economies of scale through standardization, standard sizes of solar PV units were defined. For primary schools, the following sizes were set: 5 kWp, 10 kWp, 15 kWp and 25 kWp. For secondary schools, the sizes were set as follows: 10 kWp and 25 kWp. For each school, the optimal size was determined as follows:

Annual electricity consumption x 80% / 1,300 (annual production per kWp) = optimal size

For each school, the next-smaller standard size was chosen. For schools, where the optimal size was smaller than 5 kWp, a 5 kWp unit was assumed. The planned solar PV installations described in chapter 3.6 were considered and are not taken into account in the NAMA (these will be financed and installed separately).

Discussions with the relevant authorities showed that not all schools are currently in a condition which allows the installation of solar PV units (structural weakness of roofs, stability of electricity system,…). It was assumed that 50 per cent of the schools will be ready for installation of solar PV units.

Another topic raised was the question of back-up batteries. A large number of schools are used as emergency shelters. In case of emergency, batteries would be able to secure electricity supply even if power lines are down or power supply is not available. Whereas, this would be helpful, this is considered as an adaptation measure and is not included in the NAMA.

The following table summarizes the main assumptions for the solar PV units.

[19] NURC was not able to give a timeline for the intended switch to net billing.

Parameter	Description
Maximum installed capacity	25 kWp
Maximum percentage of electricity consumption covered by solar PV	80%
Annual electricity production per kWp	1,300 kWh
Solar PV units at schools	19 schools @ 5 kWp, totaling 95 kWp 11 schools @ 10 kWp, totaling 110 kWp 8 schools @ 15 kWp, totaling 120 kWp 2 schools @ 25 kWp, totaling 50 kWp Total of 375 kW in 40 schools

Table 14: Main assumptions for solar PV units

The following table shows the implementation schedule of Intervention 2.

Year	No of kWp installed	MWh generated	GHG reduced
Year 1	56.25 (15%)	73.1	48.6
Year 2	187.5 (50%)	243.8	161.9
Year 3	375.0 (100%)	487.5	323.7

Table 15 - Implementation schedule of Intervention 2

In total, 375 kWp will be installed in primary and secondary schools; this equals approximately 1,340 panels with a total size of around 23,000 sq ft. The expected annual electricity generation from these solar PV units is 487.5 MWh, the annual emission reduction is 323.7 tons of CO2 per year. Compared to the baseline figure in 2025, this is a reduction in GHG emissions of 15.7 per cent.

The extension of schools or construction of schools is not covered by this NAMA. If schools are extended or new schools are being built, the GoSLU will work towards the installation of solar PV units on these buildings.

Outcomes of Intervention 2

Outcomes of Intervention 2:	**GHG emissions reduction per year**	**GHG emissions reduction per 15-years lifetime**
1 kWp	0,86 tCO2	ca. 12.95 tCO2e
350 kWp	323.7 tCO2	4,855.5 tCO2

Table 16: Outcomes of Intervention 2

6.3 INTERVENTION 3: TRAINING AND CAPACITY BUILDING

The implementation of Intervention 1 and Intervention 2 will be accompanied by an extensive training and capacity building programme.

The following non-technology measures will be implemented:

- Establishment of an energy accounting systems covering all primary and secondary schools
- Capacity building & awareness trainings for companies and institutions
- Curriculum on sound environmental management and sustainable development

Details on the planned activities can be found in chapter 8.

7 NAMA IMPLEMENTATION STRUCTURE

The coordination and management of the NAMA requires an institutional structure, which shall meet the following requirements:

- It must be embedded in national and sectoral policies and strategies.
- It must be capable of effective communication and reporting as required by international agencies, such as the UNFCCC.
- It must provide an interface to international bilateral and multilateral NAMA funding entities, such as the Green Climate Fund.
- It must be able to ensure proper management of financial flows between the NAMA funding entities and the recipients.
- It must be able to allow transparent monitoring of GHG emission reductions and the Sustainable Development indicators.

The institutional structure of the NAMA should be based on the following principles.

- Ensuring the strong involvement of national stakeholders to create country ownership and political commitment.
- Using existing and experienced entities which are already in place and allow for prompt and smooth implementation of the NAMA.
- Ensuring that the institutional structure is appropriate for the receipt of international private and/or public donor funding.

The institutional structure for the NAMA shall include the following institutional bodies at the country level:

- a NAMA National Focal Point or National NAMA Approver (NA);
- a NAMA Coordinating Authority (NAMA CA);
- a NAMA Implementing Entity (NAMA IE);
- NAMA Executing Entities (NAMA EEs).

National NAMA Approver/Focal Point

The national NAMA Approver or Focal Point shall inter alia:

- approve NAMAs which shall be registered at the UNFCCC;
- provide guidance to sectoral NAMA coordinating entities (access to climate finance, financial flows, MRV etc.);
- issue procedures for accounting of emission reductions to avoid double counting of emission reductions from various implemented NAMAs;
- support the preparation of the National Communication, Biennial Update Reports, Summary of GHG Reductions etc.

The **Department of Sustainable Development** will act as NAMA Approver.

The NAMA Coordinating Authority (NAMA CA)

The NAMA Coordinating Authority (NAMA CA) is the entity which coordinates the proposed NAMA on Green Schools. Its main tasks are:

- acting as primary contact for international donor(s);
- managing and directing the NAMA;
- approving
    - NAMA targets,

    - the implementation process with regard to the submission of project applications and the disbursement of funds;
- approving and updating eligible activities;
- approving annual monitoring reports prepared by the NAMA IE (covering inter alia the number of projects implemented, the calculation of emission reductions etc.); and
- supervising the financial flows between donors and beneficiaries.

The role of the NAMA Coordinating Authority will be taken by the **Department of Economic Development** in collaboration with the **Department of Education**. The exact distribution of work between these entities will be agreed bilaterally.

NAMA Implementing Entity (NAMA IE)

The NAMA IE will be responsible for handling financial flows from funding entities to the beneficiaries as well as for project approval. The NAMA IE is the main operative body of the Green Schools NAMA in Saint Lucia.

The main tasks of the NIE are to:
- ensure the proper transfer and disbursement of funds from the donors to the recipients based on an agreed set of criteria (e.g. money will be held in a trust account with limited access, money will be disbursed only after the project has been implemented, etc.);
- prepare reports to the NAMA CA/donor(s) about e.g.,
    - the use of funds,
    - the number of projects implemented,
    - targets achieved etc.;
- capacity-building for institutions and companies involved in the implementation of the NAMA;
- development of requirements for equipment/installations used under the NAMA;
- coordination of promotion and awareness raising campaigns and of support for the implementation of the NAMA;
- integration of the private sector into NAMA implementation;
- coordination of monitoring activities and preparation of monitoring reports for all interventions;
- collect data for monitoring purposes based on the MRV;
- facilitation and coordination of verification through the external entity designated for this task (if required);
- reporting to the NAMA CA in fulfilment of reporting requirements to the donor; and
- cooperation with internal and external financial auditors.

The role of the NAMA Implementing Entity will be taken by the **Renewable Energy Division of the Department of Infrastructure, Ports and Energy**.

NAMA Executing Entity (NAMA EE)

The role of the NAMA Executing Entity (NAMA EE) will be taken by the Department of Education and will implement projects under the NAMA. The NAMA EE will:
- implement projects in compliance with the rules of each intervention;
- inform the NIE about the performance of their projects.

The NAMA EE will implement the projects under Intervention 1 and 2.

The following figure shows the organisational setup of the Green Schools NAMA.

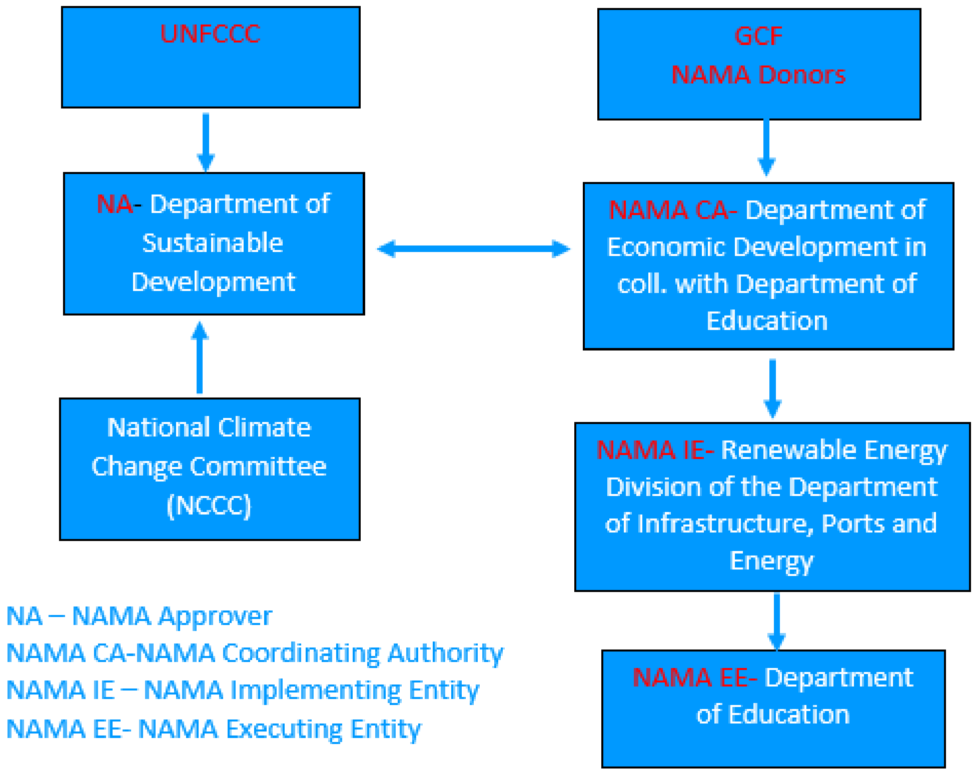

Figure 17: NAMA institutional setup

8 INSTITUTIONAL AND SECTORAL CAPACITY DEVELOPMENT NEEDS

In addition to the Interventions described in chapter 6, additional non-technology activities are necessary to build up a stable programme structure, capacities, and tools for management, coordination, communication, and dissemination in order to satisfy institutional and sectoral capacity development needs. The measures include technical assistance activities requiring external expertise and assistance, and capacity building activities that build the national in-house capacities and skills for the NAMA programme implementation.

The following non-technology measures will be implemented:

- Establishment of an energy accounting systems covering all primary and secondary schools
- Capacity building & awareness: trainings for companies and institutions
- Education for pupils on sound environmental management and sustainable development

Energy accounting system

The preparation of the NAMA has shown that there is little information on energy consumption in schools at hand both in schools and in the Department of Education. To change this and to make sure the information required for the MRV is available, an energy accounting system will be set up.

The energy accounting system will include collecting the following information:

- Monthly electricity consumption
- Monthly generation of electricity in solar PV units
- Monthly electricity fed into the grid
- Main characteristics of energy consumers (e.g. size of classrooms, installed capacity of ACs, number of LED lamps installed)
- Number of students

To allow schools to provide data easily, the energy accounting systems should be an online tool. This also helps in involving students in collecting data, data entry and data evaluation.

The energy accounting will allow the calculation of performance figures (e.g. electricity consumption/pupil or electricity consumption/sq ft). Performance figures are an important tool in analyzing effects of technology measures and can also be used to assess consumer behavior (impact of energy saving measure such as switching off computers when not in use, switching off lamps when sufficient ambient light is available, etc.). Performance figures can also be a basis for benchmarking.

For the implementation of the energy accounting system, the following sub-components are necessary:

- Programming of energy accounting system: an exact system specification will be prepared, the system will be programmed based on the specifications. After finalisation, the system will be installed and test-runs with a few selected schools will be organized. A handbook will be prepared which will serve as guidance for schools on data input and analyses.
- Roll-out of energy accounting system with training of energy experts in each school. Energy experts will have to be nominated.
- Ongoing support in managing the energy accounting system (data input, analyses).

Capacity building & awareness: trainings for companies and institutions

Proposed measure shall involve regular trainings for technology suppliers and operators in interventions 1 and 2.

The trainings will be held in order to ensure competencies, dissemination of know-how and good practices, and enlarge the pool of trained and certified technology and/or service providers. Additionally, relevant school personnel will participate in the trainings in order to increase the know-how and understanding of the technologies applied in the NAMA and be aware of maintenance required.

The following trainings will be provided:

- 4 trainings/workshops annually for the first 3 years – in order to enlarge the experts pool
- 1 training/workshop per year from the year 4 onwards – in order to maintain the up-to-date competencies.

Each supplier/provider involved in Intervention 1 or 2 and relevant school personnel should attend 1 training per year.

Education for pupils on sound environmental management and sustainable development

In addition to training pupils on energy related topics, a broader education program on environmental management and sustainable development will be prepared and implemented.[20] This education will highlight how the complex interaction of various social influences has led to the current state of our environment. It can strengthen awareness, a sense of responsibility, and the skills which allow pupils to shape their future.

The objective of the education is that pupils are to be given an opportunity to:

- Experience nature's diversity as a place of personal learning (i.e. appreciating their connectedness with the world both cognitively and emotionally),
- Explore the environment based on interdisciplinary research, and critically and constructively reflect on their findings,
- Comprehend technological change and understand it as a chance for new, long-term developments,
- Realise their democratic responsibility as active citizens, develop their own standpoints and personal value codes, and take a pro-active and constructive part in shaping society,
- Critically review their personal lifestyles and rethink the impact of individual action on the environment,
- Jointly develop sustainable future scenarios and, if possible, take concrete action in their daily routines which encourages others and sets an example.

Environmental education promotes the acquisition of competences needed to understand the finiteness of our natural resources, and contributes to shaping the environment and society in a forward-looking manner, based on solidarity and responsibility. The aim is that the education program on environmental management and sustainable development becomes part of the regular education program, so all pupils in Saint Lucia receive training on these topics.

[20] The suggested education is based on a successfully implemented program in Austria. https://www.bmb.gv.at/ministerium/rs/2014_20_ge_umwelt_en.pdf?5te8e0

9 NAMA COSTS AND FINANCE

9.1 OVERVIEW OF NAMA FINANCE

This chapter provides an indication about the financial requirements for the NAMA. The following figure gives an overview on various sources of NAMA financing:

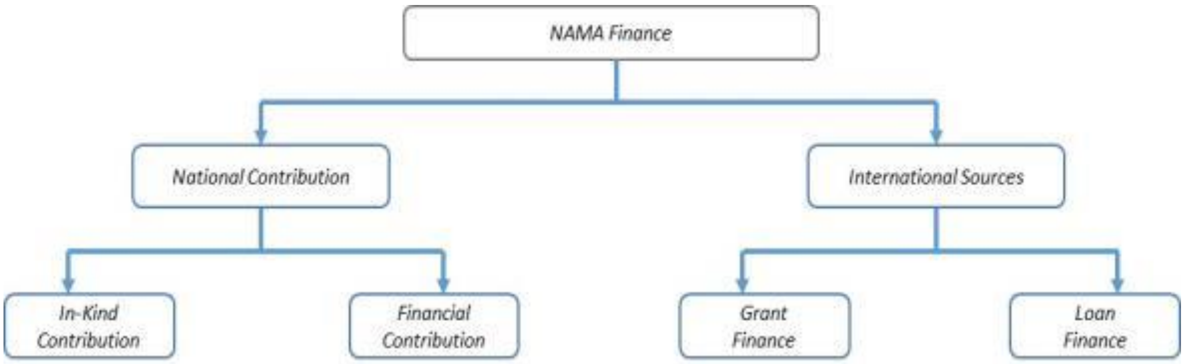

Figure 18: Schematic overview of the sources of NAMA Financing

National Contribution: National contribution includes in-kind contributions, namely contributions of goods or services, other than finance and take the form of staff time, office spaces and office equipment, IT, hardware, and equipment that directly contribute to the project activities related to the NAMA. The financial kind of national contribution can take the form of government contributions made available through budgetary allocation, consumer payments, operational subsidies from the Government and cost reduction measures, such as waived taxation. In the context of NAMA Finance, typically 'National Contribution' refers to support provided by the national / local government.

International Sources: This finance is linked directly to capacity development actions, direct investment grants, direct operational subsidies, and loan schemes provided by international support partners consisting of multilateral financing institutions and/or multilateral/bilateral programmes. International finance which goes directly to entities (through subsidies or grants) or capacity development will be managed by a Trustee charged with oversight of the funds. Approval of payments and disbursements will come from the appropriate NAMA institutional and governance system (typically the coordinating or implementing entity) and disbursed through an appropriate entity.

9.2 NAMA COSTS OF INTERVENTIONS

9.2.1 NAMA COSTS OF INTERVENTION 1

The following assumptions were made when calculating the total investment costs for the replacement of fluorescent lamps with LED lamps:

Component	Assumption
Number of lamps replaced	13,500
Investment costs per tube	USD 18.0

Transport (10%)	USD 1.8
Installation	USD 20.0
Costs per tube	USD 39.8
Total investment costs	USD 537,300

Table 17: Investment costs for lamp replacement
Sources: GoSLU, own assumptions

No taxes or duties will be charged for importing the LED lamps to Saint Lucia.

9.2.2 NAMA COSTS OF INTERVENTION 2

To calculate investment costs for Solar PV units, the following costs were assumed for the different sizes. Costs include PV panels, inverter, installation and wiring[21]:

Unit size	Cost per kWp
5 kWp	USD 3,500
10 kWp	USD 3,200
15 kWp	USD 3,000
25 kWp	USD 2,600

Table 18: Investment costs for solar PV

For approvals, management and putting into operation 15 per cent additional costs were considered.

Based on the assumed number of PV units and their size, total costs are as follows:

PV unit size	5 kW	10 kW	15 kW	25 kW
Number of PV units	19	11	8	2
Installed capacity in kW	95	110	120	50
Cost per kW in USD	USD 3,500	USD 3,200	USD 3,000	USD 2,600
Investment costs	USD 332,500	USD 352,000	USD 360,000	USD 130,000
Management	USD 49,875	USD 52,800	USD 54,000	USD 19,500
Total	USD 382,375	USD 404,800	USD 414,000	USD 149,500
Grand total				**USD 1,350,675**

Table 19: Costs of Intervention 2

9.2.3 NAMA COSTS OF INTERVENTION 3

The total costs for capacity building are estimated at USD 183,000. The breakdown of costs can be found in the table below.

[21] Cost estimates were provided by EcoCarib and the Renewable Energy Division by email.

			Year 1		Year 2		Year 3	
No	Cost component	Unit rate	No units	Costs	No units	Costs	No units	Costs
1	Energy accounting system							
1.1	Programming of energy accounting system	USD 25,000	1	USD 25,000				
1.2	Installation and testing	USD 10,000	1	USD 10,000				
1.3	Handbook	USD 15,000	1	USD 15,000				
1.4	Ongoing support	USD 10,000	1	USD 10,000	1	USD 10,000	1	USD 10,000
2	Training							
2.1	Trainings/workshops	USD 4,000	4	USD 16,000	4	USD 16,000	4	USD 16,000
3	Education package							
3.1	Preparation education package	USD 25,000	1	USD 25,000				
3.2	Ongoing support	USD 10,000	1	USD 10,000	1	USD 10,000	1	USD 10,000
	Total			**USD 111,000**		**USD 36,000**		**USD 36,000**

Table 20: Costs of Intervention 3

9.3 NAMA FINANCE

Before looking at NAMA finance, it is important to understand the financial viability of the investments projected under Intervention 1 (energy efficiency) and Intervention 2 (solar PV). For the calculation of the financial viability, the following assumptions were made:

Factor	Assumption	Comment
Electricity tariff	0.7 XCD/kWh	Based on invoices from LUCELEC for electricity consumption in schools
Feed-in tariff	0.35 XCD/kWh	Fee for electricity fed to the grid, relevant once net metering system is switched to net billing
Exchange rate USD-XCD	0.37037	Exchange rate January 2018
Replacement of grid electricity	100% for EE 80% for solar PV	80% of the electricity generated by the solar PV units replaces electricity consumed from the grid, 20% is being fed back to the grid. For energy efficiency, replacement is 100%
Interest rate	2.5%	Based on information from stakeholders, Prime Lending Rate is at 7% https://www.eccb-centralbank.org/statistics/commercial-banks-interest-rates/comparative-report/0
Operation & maintenance	0.5% of investment costs for solar	0.5% of investment costs for solar PV units, no additional maintenance costs for LED light tubes

Table 21: Assumptions for calculating financial viability

Investments into the two technologies covered by Intervention 1 and 2 give the following payback periods:

	1 LED light tube	25 kWp solar PV
Investment costs per unit	USD 39.80	USD 74,750
Energy saving/generation (in kWh/a)	39.8	32,500
Cost saving/income (per a)	USD 10.25	USD 7,258
Payback period	4-5 years	10-11 years

Table 22: Financial viability of both technologies

Both technologies show payback periods within the technical lifetime of the technologies. LED light tubes have a lifetime of around 50,000 hours. In schools, lights are used around 1,800 hours per year (200 school days with 9 hours of lighting per day), which gives a lifetime way above 25 years. Solar PV units have a minimum lifetime of 15 years. Payback of the 25 kW unit is achieved latest after 11 years.

Due to higher costs per kWp installed capacity smaller units (5-15 kWp) have a payback period between 14 and 17 years.

In order to attract NAMA financing, a good balance between national and international contribution should be offered. In an ideal case, a NAMA financier will provide a loan to the country, which is paid back by cost savings achieved by the implementation of the interventions. As both technologies are financially profitable, an attractive financing offer can be made to NAMA financiers.

The following assumptions were made for the calculations:

- Interest rate for loan from NAMA financier: 2.5%
- Financing share for Interventions 1 and 2:
    - Own capital from GoSLU 50%
    - Loan from NAMA Financier 50%
- Intervention 3 (Capacity building) is financed 50% by GoSLU and 50% by a grant from the NAMA Financier (not included in calculations)
- Repayment:
    - 70% of savings/revenue created goes to NAMA Financier until loan is redeemed.
    - 30% of savings/revenue stays with GoSLU

The following graph shows the financial flows. The NAMA Financier would provide a loan of USD 0.94 million, this loan will be redeemed by 2025 (after 5 years of full operation). The capital of the GoSLU (USD 0.94 million) will be paid back in 2026 and by 2030 the Government will have generated cost savings/revenues of around USD 0.92 million. As the lifetime of both technologies extends past 2030, the GoSLU will generate considerable cost savings/revenues from avoided electricity costs after 2030.

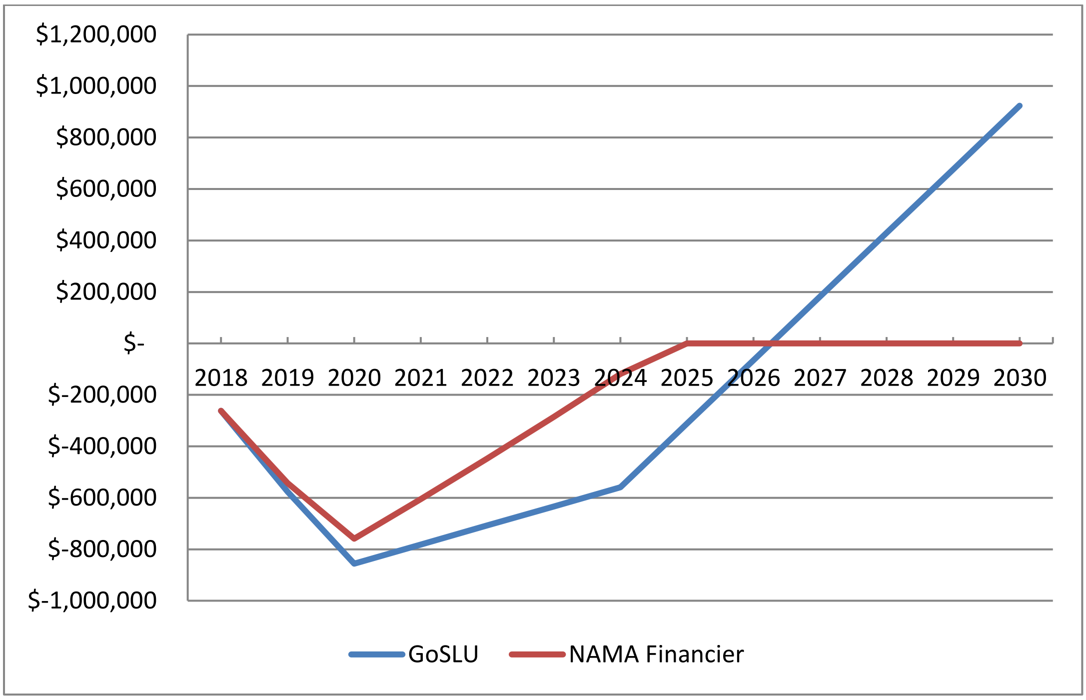

Figure 19: Financial flows

The following table summarizes the contributions to NAMA financing by year and intervention.

	Year 1	Year 2	Year 3	Total
Intervention 1	USD 322,380	USD 214,920	USD -	USD 537,300

Intervention 2	USD 202,601	USD 472,736	USD 675,338	USD 1,350,675
Intervention 3	USD 111,000	USD 36,000	USD 36,000	USD 183,000
Total	USD 635,981	USD 723,656	USD 711,338	USD 2,070,975
GoSLU	USD 317,991	USD 361,828	USD 355,669	USD 1,035,488
NAMA Financier	USD 317,991	USD 361,828	USD 355,669	USD 1,035,488
Total	USD 635,981	USD 723,656	USD 711,338	USD 2,070,975

Table 23: Contributions to NAMA financing by year and activity

The following figure shows the financial flows in the NAMA. Due to the rather small size of financing required, there is a high likelihood that the NAMA interventions of Saint Lucia will have to be bundled with NAMA interventions of other countries in the region in order to achieve a financing volume interesting for a NAMA financier. In that case, an entity coordinating financial flows and implementation of the interventions will have to be integrated in the structure. Also, NAMA financiers typically don’t transfer money to a national government, but can transfer to government entities, such as National Development Banks.

International financiers would provide contributions to the NAMA Finance Coordinator (this can be an international entity coordinating the NAMA or the National Development Bank), who then forwards the funding to the NAMA EEs (implementing projects under Interventions 1 and 2) and companies hired for carrying out capacity building activities under Intervention 3. National contributions by the GoSLU are given to the NAMA IE and then forwarded to NAMA EEs and companies hired for Intervention 3.

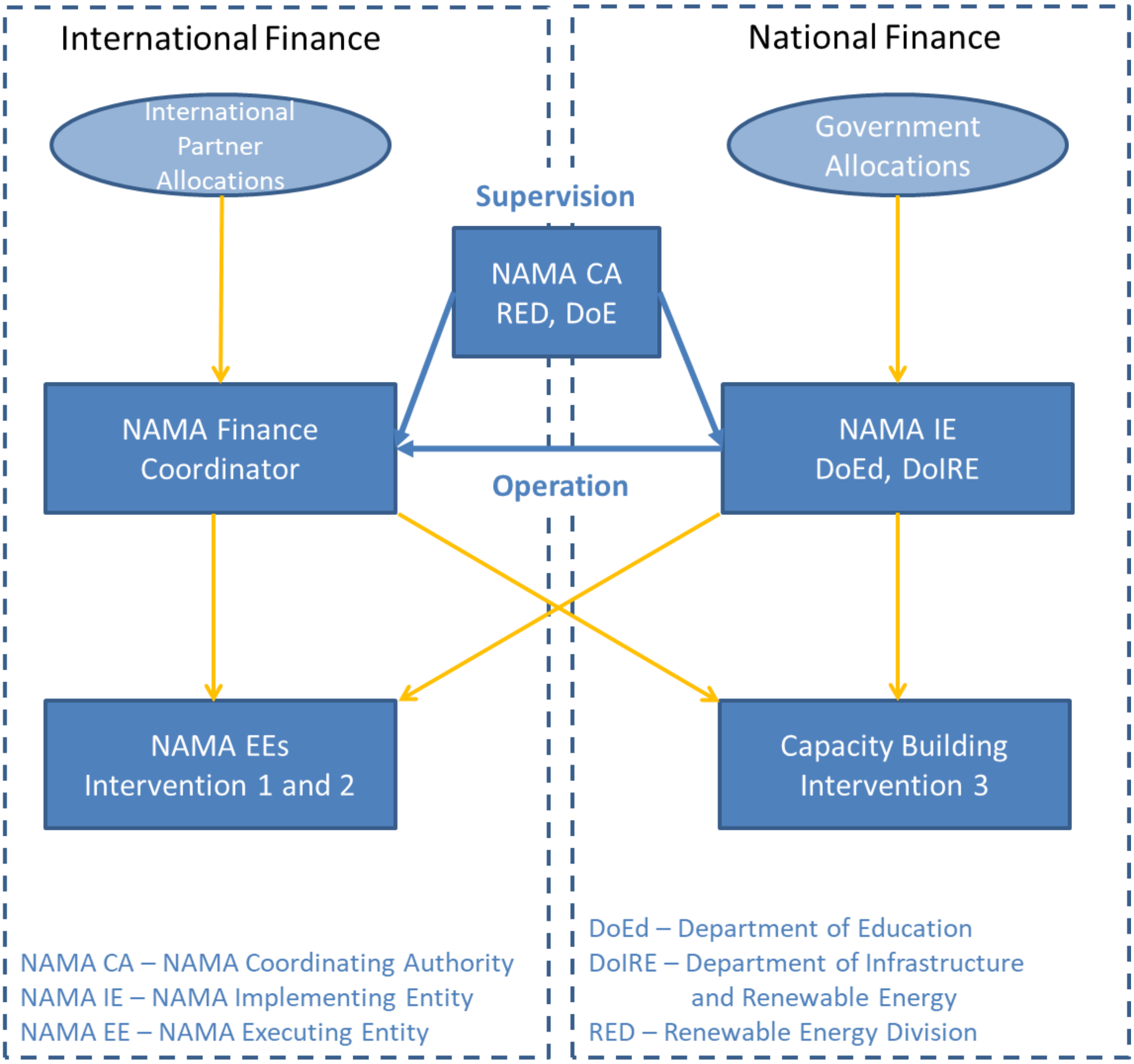

Figure 20: Financial flows in the NAMA

10 NAMA MRV

A comprehensive Measuring, Reporting and Verification (MRV) system is a crucial component of a NAMA. As a NAMA is a results-based instrument, its results need to be measurable, reportable and verifiable (MRV) in order to guarantee sustainability and success of the interventions.

The methodology for monitoring the effects of NAMAs needs to follow the general principles of transparency, consistency, comparability, completeness and accuracy. This applies to all the components to be monitored. The objective of the MRV framework is to provide a credible and transparent approach for quantifying and reporting GHG emission reductions.

The MRV system focuses on three main groups of indicators: CO2 emission reductions, sustainable development, and financial support. The MRV approaches for these indicators are described in the following sections.

10.1 GHG EMISSION REDUCTIONS

The total GHG emission reductions of the NAMA in a given year *y* (ER_y) are the sum of the emission reductions achieved by implementation of Intervention 1 – Energy Efficiency plus the emission reductions achieved by implementation of the Intervention 2 – Solar PV systems.

The emissions reductions achieved by the NAMA interventions are calculated by comparing the actual (project) emissions (PE_y) with the emissions under the baseline scenario (BE_y). For electricity generated and fed into the national grid, an emission bonus (EB_y) is considered.

Equation 1: $ER_y = BE_y - PE_y + EB_y$

Where:

Parameter	Description	Unit
ER_y	Emission reductions over the time period y	tCO_2
BE_y	Baseline emissions over the time period y	tCO_2
PE_y	Project emissions over the time period y	tCO_2
EB_y	Emission bonus over the time period y	tCO_2

Table 24: Parameters for Equation 1

For the calculation of the GHG emission reductions, the Standardized Baseline on the Grid Emission Factor of Saint Lucia is applied. The factor is 0.664 tCO2/MWh and is applicable for the first, second and third crediting period of any project. For the monitoring of emission reductions from energy efficiency measures, the approach is based on the approved CDM methodology "*AMS.II.E. – Energy efficiency and fuel switching measures for buildings*".[22]

When calculating baseline and project emissions, the occupancy of schools needs to be considered in addition to monitored consumption of electricity and LPG. Reduced number of students both lead to less consumption of electricity for lighting, air conditioning etc. and less consumption of LPG for cooking. As there is a tendency of reduced number of students in Saint Lucia, an occupancy correction factor is introduced, which compares number of students during baseline and project.

22 https://cdm.unfccc.int/filestorage/C/D/M/CDMWF_AM_LAVBAV8STPGYPWVKGQJLBCNEC8APNP/AMS_II.E._ver10_1.pdf?t=NXZ8b3hncXhhfDDGRtt-zzG2I1YJ6pNDYCdE

The baseline emissions are calculated as follows:

Equation 2: $BE_y = ((BC_{el,y} * EF_{el}) + (BC_{LPG,y} * EF_{LPG})) * (\frac{SB_y}{SP_y})$

Where:

Parameter	Description	Unit
BE_y	Baseline emissions over the time period y	tCO_2
$BC_{el,y}$	Baseline consumption of electricity in all primary and secondary schools	MWh
EF_{el}	Emission factor for the electricity grid, fixed by Standardized Baseline at 0.664 tCO_2/MWh	tCO_2/MWh
$BC_{LPG,y}$	Baseline consumption of LPG in all primary and secondary schools	MWh
EF_{LPG}	Emission factor for LPG	tCO_2/MWh
SB_y	Number of students in baseline	Number
SP_y	Number of students in project	Number
y	Period of time	-

Table 25: Parameters for Equation 2

The project emissions are calculated as follows:

Equation 3: $PE_y = ((PC_{el,y} * EF_{el}) + (PC_{LPG,y} * EF_{LPG})) * (\frac{SB_y}{SP_y})$

Where:

Parameter	Description	Unit
PE_y	Project emissions over the time period y	tCO_2
$PC_{el,y}$	Project consumption of electricity in all primary and secondary schools	MWh
EF_{el}	Emission factor for the electricity grid, fixed by Standardized Baseline at 0.664 tCO_2/MWh	tCO_2/MWh
$PC_{LPG,y}$	Project consumption of LPG in all primary and secondary schools	MWh
EF_{LPG}	Emission factor for LPG	tCO_2/MWh
SB_y	Number of students in baseline	Number
SP_y	Number of students in project	Number
y	Period of time	-

Table 26: Parameters for Equation 3

The emission bonus is calculated as follows:

Equation 4: $EB_y = EG_y * EF_{el}$

Where:

Parameter	Description	Unit
EB_y	Emission bonus over the time period y	tCO_2
EG_y	Electricity generated and fed into the grid	MWh
EF_{el}	Emission factor for the electricity grid, fixed by Standardized Baseline at 0.664 tCO_2/MWh	tCO_2/MWh

Table 27: Parameters for Equation 4

The default values that are fixed ex-ante are provided in table below.

Variable	Description	Value	Unit

$BC_{el,y}$	Baseline consumption of electricity in all primary and secondary schools	As per baseline calculations, corrected by number of students	MWh
$BC_{LPG,y}$	Baseline consumption of LPG in all primary and secondary schools	As per baseline calculations, corrected by number of students	MWh
EF_{el}	Emission factor for the electricity grid, fixed by Standardized Baseline	0.664	tCO_2/MWh
EF_{LPG}	Emission factor for LPG	74.1	tCO_2/TJ

Table 28: Default values for MRV

The following parameters will be monitored as part of the MRV:

Data/Parameter:	SP_y
Data Unit:	Number of students in project
Description:	Total number of students in primary and secondary schools in year y.
Measurement and QC procedures (if any):	Total number from Education Statistical Digest for the relevant year.
Monitoring frequency:	Yearly

Data/Parameter:	$PC_{el,y}$
Data Unit:	Project consumption of electricity in all primary and secondary schools
Description:	Project consumption of electricity in all primary and secondary schools in year y
Measurement and QC procedures (if any):	Electricity bills from all primary and secondary schools will be collected on a monthly basis and will be added up once a year
Monitoring frequency:	Measured – Continuously Recorded – Monthly

Data/Parameter:	$PC_{LPG,y}$
Data Unit:	Project consumption of LPG in all primary and secondary schools
Description:	Project consumption of LPG in all primary and secondary schools in year y
Measurement and QC procedures (if any):	Consumption of LPG will be collected annually by adding up all purchases of LPG tanks in all primary and secondary schools
Monitoring frequency:	Annually

Data/Parameter:	EG_y
Data Unit:	Electricity generated and fed into the grid
Description:	Electricity generated and fed into the grid in year y in all primary and secondary schools with new solar PV units.
Measurement and QC procedures (if any):	Information on electricity fed into the grid will be collected from all electricity bills from primary and secondary schools with new solar PV units. Information will be collected on a monthly basis and will be added up once a year.
Monitoring frequency:	Measured – Continuously Recorded – Monthly

Table 29: Parameters to be monitored in the MRV

10.2 SUSTAINABLE DEVELOPMENT BENEFITS

In addition to GHG emissions, the MRV system will monitor the impacts of the NAMA interventions on the identified SD indicators. The measurement process for these indicators is described below:

Data/Parameter:	N_{CapDev}
Data Unit:	Number
Description:	Number of persons in capacity building programme
Measurement and QC procedures (if any):	Lists of participants from the trainings provided under the NAMA will be collected by the NAMA IE and number of participants will be counted.
Monitoring frequency:	NAMA Implementing Entity (Department of Education in collaboration with Department of Infrastructure and Renewable Energy) will prepare a record on an annual basis.

Data/Parameter:	$N_{Solar\ PV}$
Data Unit:	Number
Description:	Number of solar PV units installed
Measurement and QC procedures (if any):	Information on number of solar PV units installed by end of the year will be collected by NAMA IE.
Monitoring frequency:	NAMA Implementing Entity (Department of Education in collaboration with Department of Infrastructure and Renewable Energy) will prepare a record on an annual basis.

Data/Parameter:	$N_{Energy\ efficiency}$
Data Unit:	Number
Description:	Number of schools with energy efficiency measures carried out
Measurement and QC procedures (if any):	Information on number of schools with energy efficiency measures carried out by end of the year will be collected by NAMA IE.
Monitoring frequency:	NAMA Implementing Entity (Department of Education in collaboration with Department of Infrastructure and Renewable Energy) will prepare a record on an annual basis.

Data/Parameter:	N_{Jobs}
Data Unit:	Number
Description:	Number of permanent jobs created through interventions
Measurement and QC procedures (if any):	The NAMA IE will prepare a questionnaire to investigate the number of permanent jobs created through the interventions. These questionnaires will be handed out once a year to companies involved in the installation of solar PV units and energy efficiency measures.
Monitoring frequency:	NAMA Implementing Entity (Department of Education in collaboration with Department of Infrastructure and Renewable Energy) will prepare a record on an annual basis.

Data/Parameter:	**Yes/No**
Data Unit:	Yes/No
Description:	NAMA Coordinating and implementing entities established and operational
Measurement and QC procedures (if any):	At the end of the year it is checked whether NAMA coordinating and implementing entities are established and operational.
Monitoring frequency:	NAMA Implementing Entity (Department of Education in collaboration with Department of Infrastructure and Renewable Energy) will prepare a record on an annual basis.

Table 30: SD parameters to be monitored in the MRV

10.3 FINANCIAL SUPPORT

The monitoring of financial support involves tracking the resources required and the support received from national contributions and international donor(s). The following financial support will be measured.

Data/Parameter:	$\mathbf{FS_{international}}$
Data Unit:	USD
Description:	International financial support spent per activity
Measurement and QC procedures (if any):	N/A
Monitoring frequency:	Measured continuously and recorded annually

Data / Parameter:	$\mathbf{FS_{national}}$
Data Unit:	USD
Description:	National financial support spent per activity
Measurement and QC procedures (if any):	N/A
Monitoring frequency:	Measured continuously and recorded annually

Table 31: Financial parameters to be monitored in the MRV

10.4 VERIFICATION

Verification is the periodic independent evaluation and ex post determination by third party of monitored SD parameters and emission reductions as a result of a NAMA intervention.

Verification rules for NAMAs are usually based on the requirements of the NAMA funding agencies, as well as host country requirements. The selected body for third party verification should apply appropriate assessment methodologies and be familiar with local conditions and greenhouse gas emission protocols and standards.

In order to limit verification costs, verification should occur every two years. The verification will consist of:

- Desk review of documents
- Interviews with key stakeholders

11 NAMA IMPLEMENTATION PLAN

The implementation of the NAMA will be carried out in three main steps. As a first step, the institutional structure for NAMA implementation proposed in this document needs to be established. In parallel, funding from both international and national sources needs to be secured. Once these first two steps are finalized, implementation of the two interventions can start.

11.1 ESTABLISHMENT OF THE INSTITUTIONAL STRUCTURE FOR THE NAMA IMPLEMENTATION

The institutional structure proposed in Chapter 7 of this document needs to be established as a basis for the interventions. The benefit of the proposed structure is that all the players already exist and no new body needs to be created. What needs to be confirmed are the roles each of the stakeholders will play.

It is suggested that implementation should start with an initial meeting of all key stakeholders involved in the NAMA. In this first meeting, the distribution of roles (NAMA Approver – NAMA NA, NAMA Coordinating Authority – NAMA CA, NAMA Implementing Entity – NAMA IE) as well as the distribution of tasks should be confirmed.

11.2 SECURING DONOR SUPPORT AND DOMESTIC FUNDING

Early stage consultations with donors are essential for securing sufficient donor funding. Informal distribution of information about the NAMA concept should start immediately, even before a final version of the NAMA document is available. Formal approaches to potential donors should start as soon as the NAMA document is finalized.

A secured budget for the domestically funded component always provides a strong signal to potential donors of a commitment to NAMA implementation. Therefore, it is essential that the domestic contribution to the interventions (co-funding of investment costs for all three Interventions) are secured within the state budget.

11.3 IMPLEMENTATION OF INTERVENTIONS

Once the institutional structure is in place and funding (both national and international) is secured, implementation of the interventions can start. The process of implementation will be as described in detail in chapter 6.

12 BIBLIOGRAPHY

CARIBSAVE, 2012. *CARIBSAVE Climate Change Risk Profile for Saint Lucia.* [Online] Available at: http://www.caribbeanclimate.bz/closed-projects/2009-2011-the-caribsave-climate-change-risk-atlas-cccra.html

CREDP, 2013. *A Review of the Status of the Interconnection of Distributed Renewables to the Grid in CARICOM Countries.* [Online] Available at: http://www.credp.org/Data/CREDP-GIZ_Interconnection_Report_Final_Oct_2013.pdf

GoSLU, 2004. *Disaster Management Policy Framework for Saint Lucia.* [Online] Available at: http://archive.stlucia.gov.lc/nemp/policies/DMPolicyFramework.pdf

GoSLU, 2006. *Hazard Mitigation Policy.* [Online] Available at: http://www.caribank.org/wp-content/uploads/2012/03/St.-Lucia-Final-National-Hazard-Mitigation-Policy-May-2006.pdf

GoSLU, 2010. *Saint Lucia National Energy Policy.* [Online] Available at: http://www.oas.org/en/sedi/dsd/Energy/Doc/NEP_StLucia_web.pdf

GoSLU, 2011. *Second National Communication (SNC) on Climate Change.* [Online] Available at: http://unfccc.int/essential_background/library/items/3599.php?rec=j&priref=7625#beg

GoSLU, 2012. *National Environmental Education Strategy for Saint Lucia 2012-2017.* [Online] Available at: Provided by UNDP

GoSLU, 2015. *Education Statistical Digest.* [Online] Available at: http://www.govt.lc/media.govt.lc/www/resources/publications/digest-2015-electronic-version.pdf

GoSLU, 2015. *Intended Nationally Determined Contribution.* [Online] Available at: http://www4.unfccc.int/ndcregistry/PublishedDocuments/Saint%20Lucia%20First/Saint%20Lucia's%20INDC%2018th%20November%202015.pdf

GoSLU, 2016. *Nationally Determined Contribution (NDC).* [Online] Available at: http://www4.unfccc.int/ndcregistry/PublishedDocuments/Saint%20Lucia%20First/Saint%20Lucia%27s%20INDC%2018th%20November%202015.pdf

GoSLU, 2016. *Saint Lucia National Circumstances Final Report.* [Online] Available at: provided by email

GoSLU, 2017. *Third National Communication.* [Online] Available at: http://unfccc.int/files/national_reports/non-annex_i_natcom/application/zip/third_national_communication__saint_lucia_2017.zip

GoSLU, 2017. *Third National Communication on Climate Change for Saint Lucia.* [Online] Available at: http://unfccc.int/national_reports/non-annex_i_natcom/items/10124.php

interview, 2016. [Interview] (05 03 2016).

Laboratory, N. R. E., 2015. *Energy Snapshot Saint Lucia.* [Online] Available at: https://www.nrel.gov/docs/fy15osti/62688.pdf

LUCELEC, 2017. *LUCELEC 2016 Annual Report.* [Online] Available at: http://www.lucelec.com/sites/default/files/annual-reports/LUCELEC-2016-Annual-Report.pdf

MoFSLU, 2013 upd. 2016. *DVRP Environmental Assessment & Environmental Management Framework.* [Online] Available at: http://www.finance.gov.lc/resources/index/34/page:1

OECS, 2015. *OECS Building Code.* [Online] Available at: http://www.oecs.org/public-resources-centre/oecs-library/oecs-building-code-1-5/download

SE4ALL, 2012. *Barbados Declaration on Achieving Sustainable Energy for All in Small Island Developing States (SIDS).* [Online] Available at: http://www.sidsenergyforall.org/wp-content/uploads/downloads/2012/05/Barbados-Declaration-on-Achieving-Sustainable-Energy-for-All-in-Small-Island-Development-States-SIDS.pdf

Stiebert, S., 2015. *Saint Lucia Mitigation Assessment.* [Online] Available at: provided by email

TERI, 2015. *Global Sustainable Development Report 2015: Climate Change and Sustainable Development.* [Online] Available at: https://global.oup.com/academic/product/global-sustainable-development-report-2015-climate-change-and-sustainable-development-9780199459179?cc=at&lang=en&#

Tulsie, J. E. &. B., 2010. *National Issues Report on Key Sector of Energy (Mitigation) For Saint Lucia.* [Online].

UNDP, 2014. *Nationally Appropriate Mitigation Action (NAMA) Sustainable Development Evaluation Tool.* [Online] Available at: http://www.undp.org/content/undp/en/home/librarypage/environment-energy/mdg-carbon/NAMA-sustainable-development-evaluation-tool.html