



SOLOMON ISLANDS NATIONAL ENERGY
POLICY AND STRATEGIC PLAN

Volume 2

**ENERGY EFFICIENCY AND
ENERGY CONSERVATION:
A STRATEGY AND
INVESTMENT PLAN**
(2014–2019)

MINISTRY OF MINES, ENERGY AND RURAL
ELECTRIFICATION



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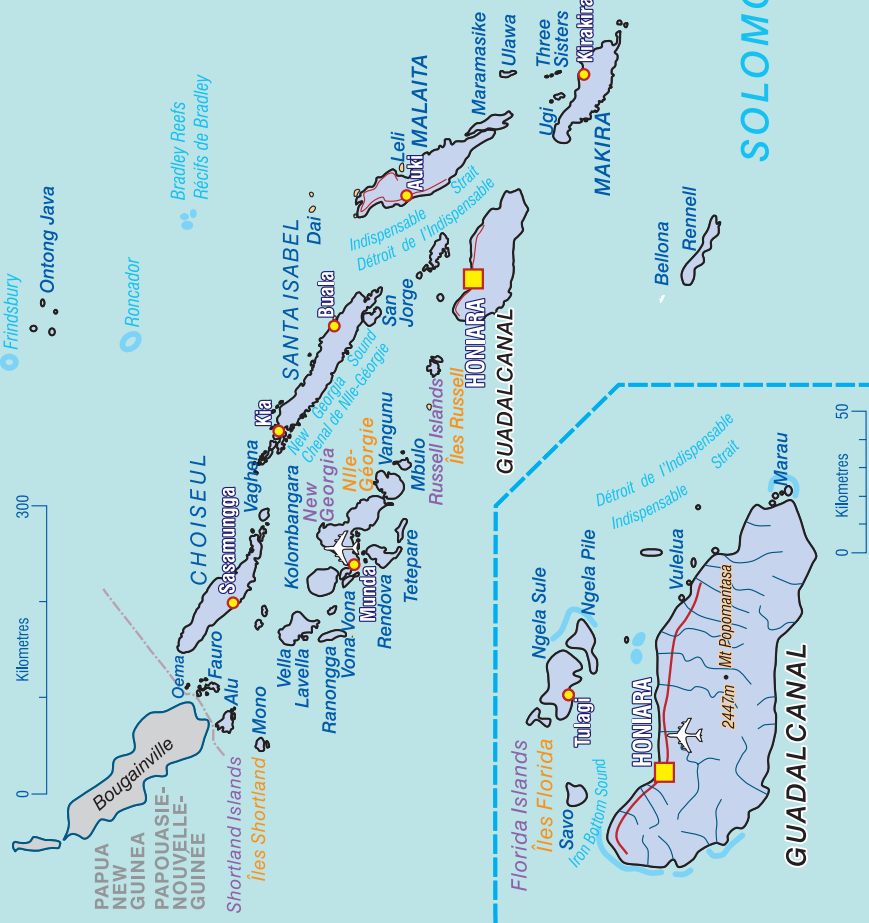
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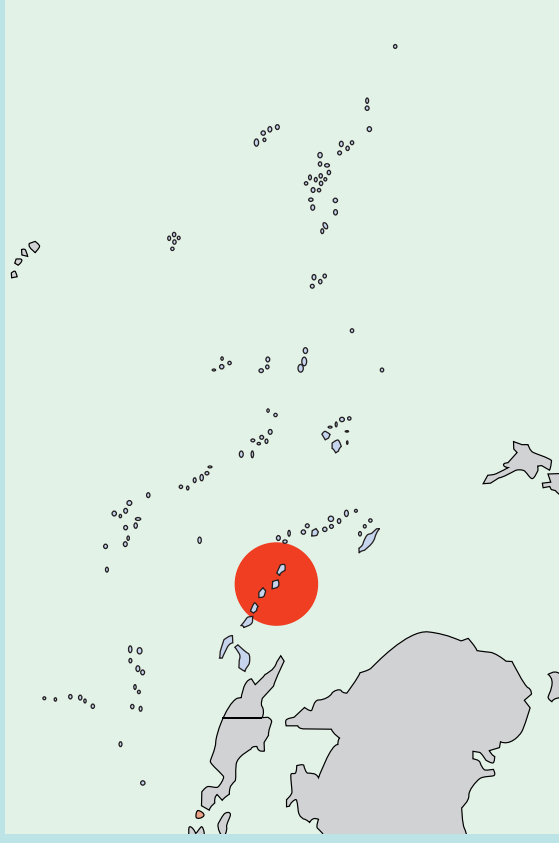
MINISTRY OF MINES, ENERGY AND RURAL ELECTRIFICATION
2014



Solomon Islands



SOLOMON SEA



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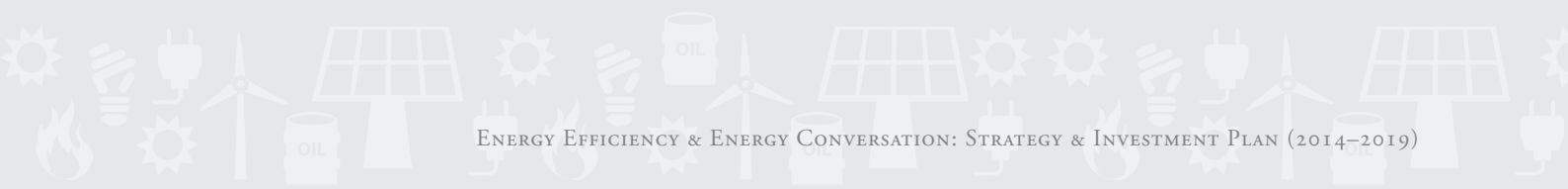
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FOREWORD



I am pleased to present to you *Solomon Islands National Energy Policy and Strategic Plan – Volume 2: Energy efficiency and energy conservation: a strategy and investment plan* (EE-EC-SIP), which presents the priorities of the government and the strategic directions for the energy efficiency and conservation sub-sector over the next five years. This volume is aligned to the *2014 National Energy Policy* vision and goals.

Energy efficiency and conservation is a key enabler to reducing electricity bills and ultimately our reliance on imported fossil fuels through changing the ways we use electricity at home, in offices, in industries and in public places. Thus it is important to mainstream energy efficiency and conservation measures in every aspect of our lives – at home, at school and in the work place.

EE-EC-SIP provides tactics and planned activities to reduce electricity demands in residential, government, industrial and commercial buildings, with a focus on lighting, refrigeration and air conditioning units, the major energy consumers. These activities will pursue the overall national energy policy goal on energy efficiency and improving energy conservation in all sectors by 2019.

The 2009 Solomon Islands Energy Security Indicator profile shows that the productivity indicator is only 45.6% which is quite low compared to other Pacific Island countries, an indication that there is a need for improvement in the way we use imported fossil fuel for electricity generation, and for commercial and industrial uses. Our own electricity provider, SIEA, is encouraged to promote efficiency in all its power generators so it can also provide more affordable electricity. As energy consumers, we also need to do our part by reducing our demand for electricity. We need to understand and examine our electricity bill, identify the energy consuming devices at home and in our offices, and work out the number of hours we use these appliances within a 24-hour period.

It is very important and timely that this strategy has integrated the appliance and labelling programme that will assist the government in regulating the importation of inefficient appliances for lighting, refrigeration and air conditioning. The programme will also create the needed awareness on energy efficient labelling and overall conservation measures. By regulating the number of inefficient appliances, we can also reduce our electricity demand, consumption and wastage.

EE-EC-SIP is a document that is historical to the government in that it provides specific targets and energy savings to be achieved within five years of implementation. It therefore needs commitments and monitoring by the various stakeholders.

The EE-EC-SIP was developed in close consultation with energy service providers, representatives of government and communities, the private sector, and development partners. The strategy also includes capacity development and technical assistance, and it is anticipated that, through the implementation of this strategy, more energy efficiency service companies will be created to provide energy auditing services to the government, to businesses and to industry.

In conclusion, I wish to thank all national stakeholders and development partners for their contributions to the second volume of the *Solomon Islands National Energy Policy and Strategic Plan*. Its implementation requires a concerted effort from all stakeholders and I strongly encourage you to continue to support and contribute to the implementation of the strategies and activities identified in this document. This will help improve the lives of all Solomon Islanders.

A handwritten signature in black ink, appearing to be 'M. Garu', written in a cursive style.

Hon. Moses Garu
Minister for Mines, Energy and Rural Electrification

PREFACE AND ACKNOWLEDGMENT

The Energy Programme of the Economic Development Division is acknowledged for the technical support provided to the Energy Division in the formulation of this strategy and investment plan. In addition, appreciation is accorded to the local stakeholders, government ministries, private sectors, non-government organisations who have participated at both the national consultations and those who have provided direct inputs to this strategy.

The formulation of this strategy was done as part of the review and development of the 2014 SINEP and formulation of energy sub sectors strategies and investment plan including the petroleum and renewable energy. The Ministry of Energy, Mines and Rural Electrification has been instrumental in directing the development of SINEP and strategy and investment plans as it sees a need for a more cohesive approach to its planning and that all its efforts are aligned to the National Development Strategy key focus areas. A five years approach to budget allocations by Parliament has also been adopted by the Solomon Islands Government in 2014 and this provides a clear direction in financial resources that are available against implementation of sectoral policies and strategies. Thus the EE-EC-SIP is a five year plan and is intended as a guiding document to the Solomon Islands government and development partners.

The first consultation on the review and the formulation of the EE-EC-SIP was conducted in November 2012. The final draft was presented at the National Energy Forum held in Honiara in June 2013. The draft EE-EC-SIP was circulated for comments by various stakeholders in November 2013.

This EE-EC-SIP is presented as Volume 2 of the Solomon Islands National Energy Policy and Strategic Plan which contains 4 Volumes; Volume I covers the overarching policy and how it aligns to the National Development Strategy, Volume II contains the Energy efficiency and conservation sub sector strategies, actions and investment plan, Volume III contains petroleum sub sector strategies, actions and investment plans, while Volume IV contains renewable energy strategies, action and investment plan. Volume V contains the administration and planning sub sector strategies and action plans which will be used as a 5 year work plan for the Energy Division. A report titled 'Solomon Islands Energy Sector Review' provides a review of the 2007 SINEP and its 2009 National Action Plan as well baseline information and data on the different energy sub sectors.



EXECUTIVE SUMMARY

Energy efficiency and energy conservation: a strategy and investment plan (EE-ECSIP) provides a way forward for strengthening the energy efficiency sub-sector in the next five years (2014–2019). The strategy reflects the overall strategic vision of the Government of Solomon Islands as set out in the *National Development Strategy 2011–2020* (NDS), and will contribute to make progress towards its objectives. The goal of the EE-EC-SIP is to greatly increase awareness and uptake of energy efficiency practices. This will reduce the amount of fuel imports needed and, consequently, the fuel and electricity bills of consumers.

The proposed Energy Advisory Committee will provide leadership, and drive the implementation of the EE-EC-SIP, liaising between ministries and agencies, and assisting in the implementation of the wider energy programme and projects across the energy sector. The Energy Division (ED) will coordinate the implementation, monitoring and evaluation of the EE-EC-SIP.

Baseline and targets

Baseline data and information and targets relevant are compiled from the EE indicator of the regional framework for action on energy security, also the supply side management, demand side management and energy efficiency labelling for electric appliance.

	Baseline and targets		
	2009	2012	2019
Framework for Action on Energy Security in the Pacific (FAESP) indicators			
➤ Energy intensity ¹ (MJ/SBD)	8.1		<8.1
SIEA power system annual losses are reduced to acceptable level			
➤ Station or generation losses		2.89%	<2.89%
➤ Technical losses		5.85%	<4.0%
➤ Non- technical losses		17.05%	<4.0%
Electricity consumption is reduced by 9.2MWh or 10.7% from demand side management			
	2012	2019	
	kWh	kWh (saved)	Overall contribution (%)
➤ Reduce electricity consumption in domestic services by 10% from 2012	13,141,960	1,775,483	2.1
➤ Reduce electricity consumption in government services by 20% from 2012 level	7,214,272	1,949,300	2.3
➤ Reduce electricity consumption in commercial services by 5% from 2012	36,866,547	2,490,340	2.9
➤ Reduce electricity consumption in industrial services by 5% from 2012	5,898,450	398,441	0.5
➤ Reduce electricity consumption through other initiatives by 5% from 2012	751,964	50,795	0.1
Electricity savings through the Pacific Appliance and Labelling Standards programme			
➤ Annual electricity savings (kWh) from labelling and standards		2,561,642	3.0

¹ Energy intensity tracks the amount of energy used to produce 1 USD of GDP. The lower the EI, the more energy efficient the economy.

Policies for energy efficiency and outcomes for the five years 2014–2019

Policy 1: Promote energy efficiency and conservation measures in the electricity sector

O1.1: Improve diesel power generation efficiency by at least 4 kWh/l from 2009 level

Policy 2: Promote energy efficiency and conservation measures at the government, residential, commercial and businesses sectors

O2.1: Reduce electricity consumption in government services by 20% in 2019, while increasing efficiency of service delivery by 2019

O2.2: Reduce electricity consumption in residential services by 10% in 2019

O2.3: Reduce electricity consumption in commercial services by 5% in 2019

O2.4: Reduce electricity consumption in industrial services by 5% in 2019

O2.5: Build a sufficient body of expertise within government in order to develop national energy efficiency targets by 2019

O2.6: Increase nationwide levels of awareness leading to strong demand for energy efficiency products and services

O2.7: Include course materials on energy efficiency and conservation at all levels of the education systems from primary to secondary schools by 2019

Policy 3: Encourage energy efficiency in appliances, equipment and technologies

O3.1: By 2019, realise electricity savings of 2.56 GWh from mandatory implementation of minimum energy performance standards and energy labelling for freezers, refrigerators, lights and air conditioning units

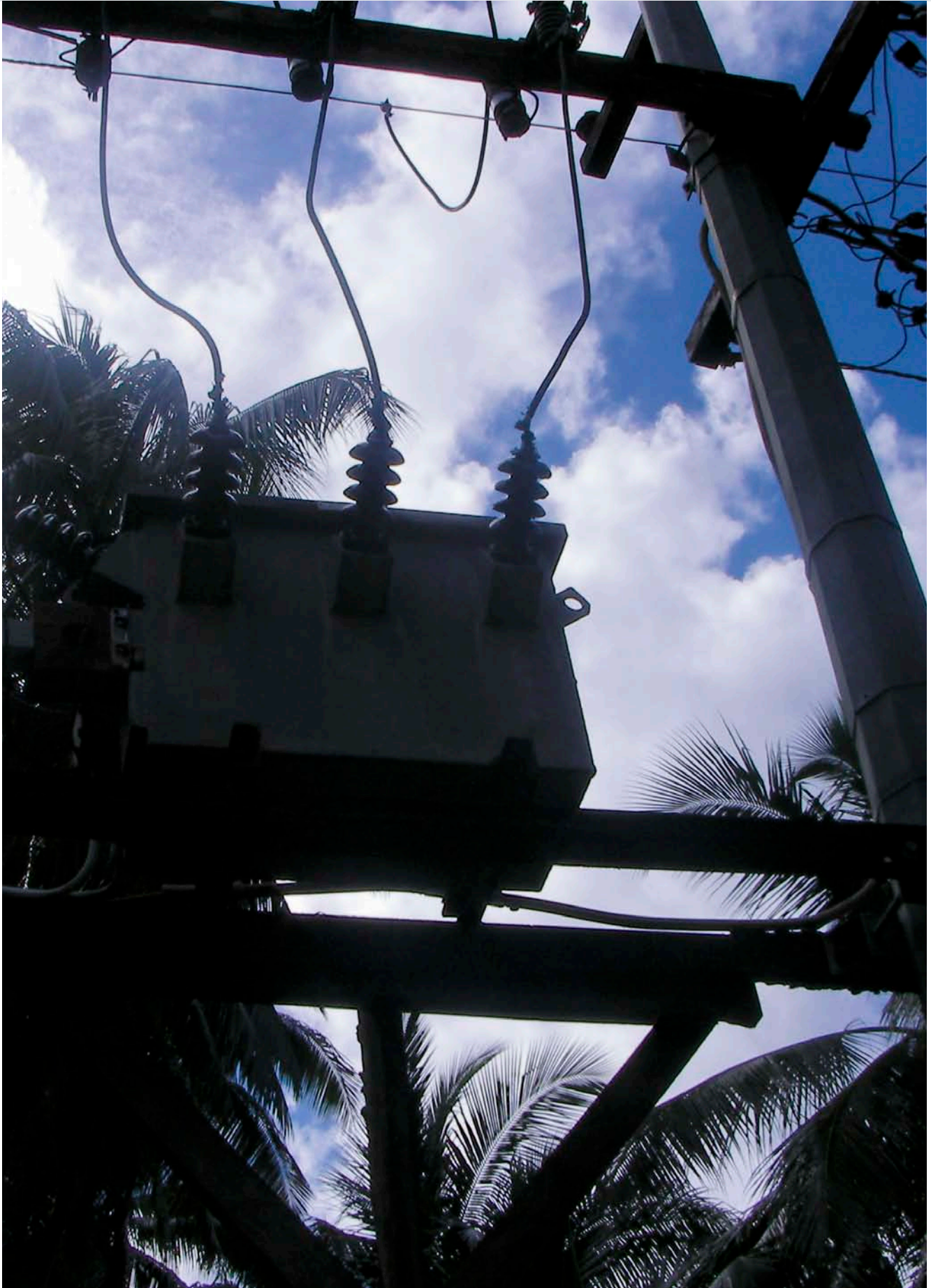
O3.2: By 2019, fully realise incentives for the purchase and use of efficient vehicles and cooking technologies

Priority actions for energy efficiency

POWER UTILITIES	Increase power generation efficiency and reduce losses Carry out supply-side management activities, including auditing of SIEA power station and installation of cooling systems and new generators
GOVERNMENT-LED INITIATIVES	Extensive data collection and collation Energy audits of government-owned buildings Government energy awareness programmes Lighting improvements Mentoring and strengthening capacity of government officials on EE-EC-SIP and its implementation
COMMERCIAL AND INDUSTRIAL SECTOR INITIATIVES	Energy auditing, cooling load improvements – Building insulation and AC unit retrofits, Monitoring and conservation efforts, EE improvements – equipment retrofits and lighting improvements and capacity development
PUBLIC AWARENESS	Energy awareness programmes in Honiara and provincial centres Tax incentives on the use of energy efficient lights Household energy efficient retrofit loan systems established Household electricity bill rebate initiative
APPLIANCE AND LABELLING PROGRAMMES, EQUIPMENT AND TECHNOLOGIES	Energy labelling and standards for freezers, refrigerators, lights and air conditioners; Tax incentives on the use of energy efficient vehicles, including LPG vehicles and cooking technologies

Investment

The total investment to implement the priority area strategies (excluding the power utilities) over five years is estimated at SBD 49,733,141 equivalent to USD 6.75 million (exchange rate: 0.1264). Solomon Islands government seeks funding and long-term commitment by donors for the investment plan.



PART 1: INTRODUCTION

This EE-EC-SIP provides a five-year plan that details requirements of government, power utilities, the commercial sector, industries, development partners, donors, and the private sector **to implement the energy efficiency and energy conservation policy component of the National Energy Policy** (Volume 1: National Energy Policy 2014–2024). The EE-EC-SIP is also developed in line with the Solomon Island government focus areas and objectives as outlined in the National Development Strategy 2011–2020.

There have been limited efforts in past years to improve energy efficiency (EE) and energy conservation (EC) activities at the national and local level, and it is anticipated that, with the development of this EE-EC-SIP, government and the development partners will support its implementation so that a visible improvement in energy efficiency can be realised over the next five years.

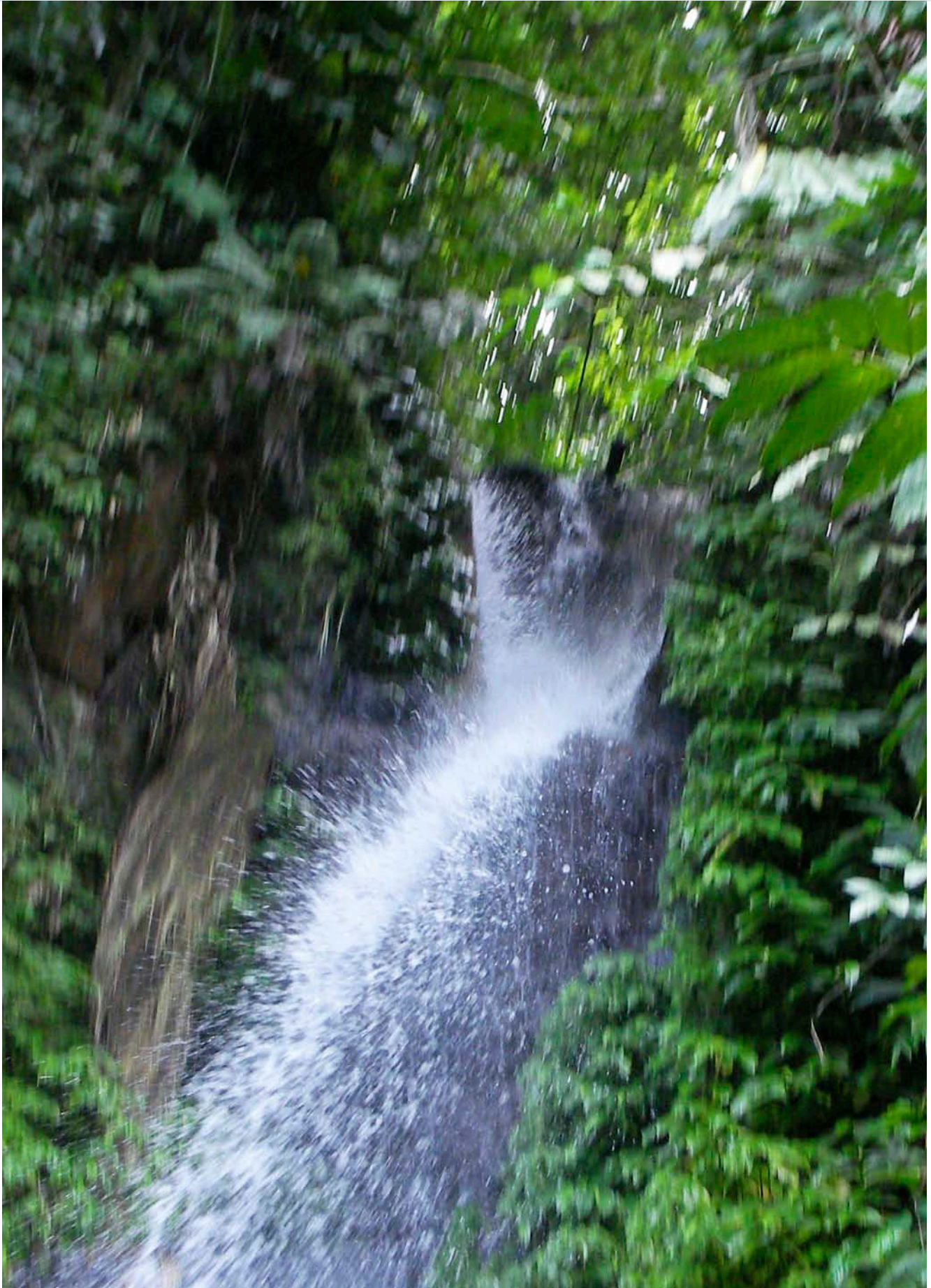
EE-EC-SIP was prepared using a consultative approach, the stakeholders contributing to defining the strategies and actions that are needed to achieve the energy efficiency and policy outcomes. Data collected during the formulation of this strategy were also used to develop the EE-EC targets and investment plans.

This is the first attempt to put together a strategy on EE and EC that covers both the supply side management and the demand side management. The activities under the supply side management were sourced from the *Solomon Islands Electricity Authority (SIEA) Development Strategic Plan 2014–2016*, which also provides more detailed strategies related to its overall transformation into a more efficient electricity provider.

This EE-EC-SIP does not have a monitoring and evaluation (M&E) plan, as this need to be developed through a more consultative process, involving the private sector, and the commercial and industrial sectors. A national workshop is included as part of this strategy to bring together these stakeholders and to also develop an M&E plan on the priority actions already identified.

The *National Energy Policy 2014–2024* and the *Review of the Solomon Islands Energy Sector Report* are to be referred to for in-depth information relating to this strategy.





PART 2: REVIEW OF ENERGY EFFICIENCY AND CONSERVATION INITIATIVES

2.1 Review of the 2007 energy efficiency and conservation action plan

The 2007 Solomon Island National Energy Plan (SINEP) with its two-year Strategic Action Plan (2007–2009) was reviewed as part of developing this strategy and the 2014 SINEP. The 2007 SINEP section on energy efficiency and energy conservation has one policy statement, two strategies and one activity under each strategy. Table 1 provides an assessment of the 2007–2009 energy efficiency and conservation strategies and activities.

Table 1: Summary of status of implementation of energy efficiency and conservation policy

Reference	Policies, strategies, actions	Fulfilled	Details	Ranking of progress	Relevant to the future?
Policy statement					
1	Ensure that energy conservation and efficiency measures are promoted in all aspects of energy production and use.	Partly	The policy is not fulfilled due to lack of implementation between 2007 and 2009. However, some awareness programmes were carried out by MMERE and SIEA in 2011. SIEA continues with its own EE activities.	Unsatisfactory	Yes
Strategies and activities					
1.1	Promote the use of appliance labelling and EE ratings.	No	Not implemented during the plan time frame. Since 2012, Solomon Islands has been assisted by SPC to develop legislation on energy efficient appliances and energy labels.	Unsatisfactory	Yes
1.1.1	Develop minimum energy performance standards for refrigerators and freezers	No	No minimum energy performance standards (MEPS) were developed for refrigerators and freezers during the plan time frame. Solomon Islands has shown an interest in the PALS programme, cabinet has given approval.	Unsatisfactory	Yes
1.2	Promote appropriate energy efficient equipment and technology	Partly	Some equipment, such as led lights, energy efficient lights and energy star-rated refrigerators and air-cons, are available in the market, but there is no legislation on this.	Unsatisfactory	Yes
1.2.1	Develop, implement and enforce national efficiency and safety standards for energy technologies, equipment and appliances.	No	No standards were developed or adopted	Unsatisfactory	Yes

	Policy	Strategies	Action	Total
Fulfilled	0	0	0	0
Partly fulfilled	1	1	0	2
Not fulfilled	0	1	2	3

The assessment indicated that there were no profound efforts to implement EE and EC programmes in Solomon Islands. Past EE efforts included the installation of timer switches on air conditioning units at MMERE in 1997, awareness through television on EC measures to reduce electricity bills, and the energy audit of Rove Prison complex in 2010. In 2011 radio awareness programmes on simple housekeeping and safety measures were conducted by MMERE and SIEA. Most of the activities under the 2007 action plan are relevant and therefore are again considered as part of this strategy.

2.2 Pacific Appliance Labelling and Standards programme

The Pacific Appliance Labelling and Standards (PALS) programme is a recent (2012) programme implemented by SPC in which Solomon Islands is participating. The programme aims to prohibit the entry of inefficient electrical appliances to PICTs through the adoption of legally enforceable minimum energy performance standards and energy labelling. The energy label helps buyers choose the more efficient of the products that meet the minimum standards. Appliances such as refrigerators, freezers, air conditioning units and lights are covered by the programme. The Government of Solomon Islands has endorsed the implementation of PALS in Solomon Islands, understanding the need for proper legal frameworks covering appliance minimum energy performance standards and labelling.

2.3 Solomon Islands Electricity Authority energy efficiency initiatives

The Solomon Islands Sustainable Energy Programme (SISEP) implemented by the World Bank from 2009 to 2013 is an initiative that will improve the supply side energy efficiency of the power utility. This is being done through the improvement of SIEA's financial position, recruitment of management expertise, and improvement of SIEA's technical operations.

In 2012, the Pacific Power Association contracted KEMA to conduct a study titled the *Quantification of the Power System Energy Losses in South Pacific Utilities*. The KEMA report highlighted the fact that the losses throughout the SIEA system consist of power station losses and distribution system losses. KEMA's analysis showed that losses total 22.91% of annual generation, which is a very high percentage. These losses consist of:

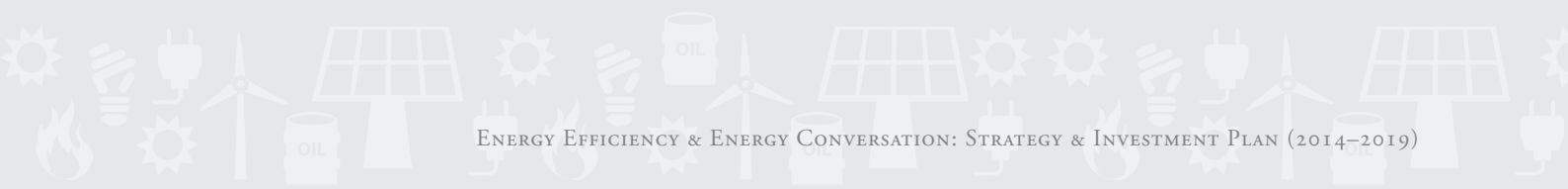
- 2.89% in power station auxiliaries (station losses),
- 5.85% in technical losses, and
- 17.05% in non-technical losses.

Recommendations to improve technical and non-technical losses were provided by the consultants as part of the KEMA analysis reports and the recommendations are considered in this EE-EC-SIP.

The low uptake of energy conservation and efficiency initiatives could be attributed to the following issues, which are also taken into consideration in this strategy.

- (a) Lack of information and awareness of the potential for energy conservation and efficiency initiatives
- (b) Limited consumer knowledge and understanding of EE
- (c) Emphasis on increasing energy supplies and not on reducing consumption
- (d) Non-participation of the private sector in EE services
- (e) Limited technical knowledge of EE
- (f) Limited or non-provision of government funds for EE
- (g) Limited human resources and technical knowledge available within the Energy Division to address EE
- (h) Lack of consistency in undertaking EE activities
- (i) Lack of a legal and regulatory framework for EE, e.g. for enforcing minimum energy standards for imported products
- (j) Lack of a champion to drive EE

In its attempt to address EE and EC, the *Solomon Islands National Development Strategy 2011–2020* highlighted the efficient use of energy and promotion of EC measures. Specifically, the policy on energy is: 'to ensure availability and efficient use of energy to achieve development goals of improving the livelihood and quality of life for all the people in the Solomon Islands,' and one of its strategies is: 'to reduce energy costs by promoting energy conservation and efficiency, in the context of the introduction of product standards for appliances, including appliance labelling, EE ratings and promotion of energy efficient technology and ensure minimal negative environmental impacts of energy production, distribution and consumption on the environment'.



PART 3: ENERGY EFFICIENCY AND CONSERVATION STRATEGIES AND ACTIONS

The following section discusses key strategy areas, actions and targets for energy efficiency improvement in several sectors over the next five years.

3.1 The electricity sector

Promoting EE initiatives in the electricity sector can be considered under two main components: the supply side and the demand side initiatives. The SIEA, with support from the World Bank, will continue with its institutional strengthening programme to improve supply side management (SSM), its system losses, conversion efficiency and its financial position. In order to reduce its dependence on fossil fuels, the utility is using bio fuel in one of its generators but has been challenged by the irregular supply of coconut oil. The SIEA, through its customer care department, improves demand side management and broadcasts a weekly radio programme that includes awareness and power saving tips. It also approves imported electrical wiring for the distribution of electricity, and it has embarked on the use of pre-paid meters to replace the conventional electricity meters for households in Honiara.

3.2 Government to lead by example

The government, being a key energy consumer, can play a major role in changing the society towards a more energy efficient one through leading by example in good energy management practices.

The collation of detailed energy consumption data to identify energy trends and inefficiencies has been an ongoing challenge. The importing oil companies are reluctant to release confidential information about the quantities of fuel they sell to the various sectors of the economy: building and construction, transport, industry, and machinery and equipment. As a result, effective planning and policy design and setting EE targets by the Energy Division (ED) is hampered. There is a need to investigate ways and means by which crucial data on energy consumption can be made available to the ED on a timely basis in order for evidence-based policy design to be undertaken.

Having identified the patterns of energy consumption within government, energy audits will be carried out in order to determine specific areas where energy savings can be made. Whilst private sector involvement in energy audits is limited, the ED will ensure that the financial and human resources are sufficient to carry out this task. In order to effectively signal the government's intentions for EE, appropriate legislation for appliance labelling and standards is being pursued.

Government has been allowing duty-free imports of solar equipment since 2010. In order to encourage the utilisation of energy efficient technologies, the tariff policy surrounding energy-efficient goods may need to be reconsidered. Allowing duty-free imports of these items would enable a structural change to higher energy efficiency and again signal the government's intentions, which would further encourage the change. Duty free status, or at least reduced duties on imports of energy efficient technologies, would need to be considered. A policy of this nature would need to be in place until a significant swap to energy efficient technologies has been achieved.

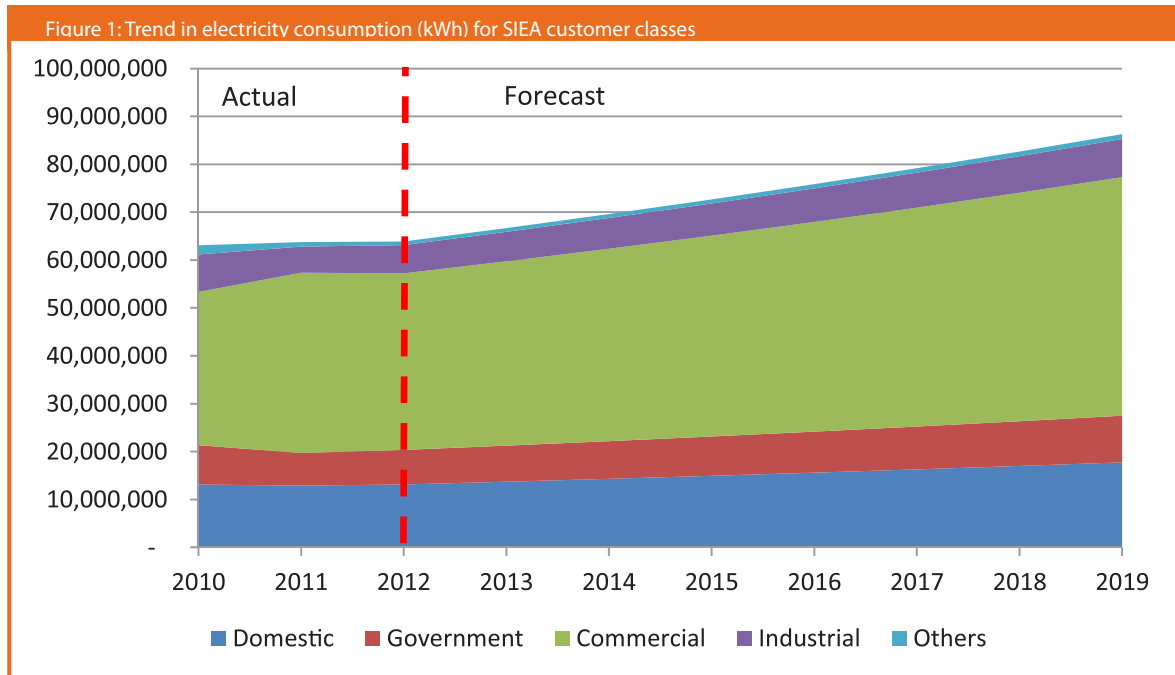
3.3 Residential sector

It is important that the public be made aware of the unsustainable trends in energy consumption currently being observed in Solomon Islands, as well as steps that can be taken to save money in light of the rising fuel and electricity prices. The ED will strengthen its awareness programme, launch a public awareness campaign on EE and EC, and ensure that there is adequate funding to continue awareness raising in future years.

Households can be encouraged to undertake their own energy audits with the aid of a simple checklist that can be made available and publicised. They can use SPC's energy consumption calculation sheet (Annex 1) and electricity wattage for home appliances (Annex 2). This awareness and use of an energy consumption checklist can be started off at schools, as well as in organised networks such as women's groups, church groups and other community-based organisations. This strategy includes some of the activities with estimated costs that are practical and effective in reducing electricity consumption. SIEA has developed a three-year plan, which includes EE as part of its customer services in order to continue creating awareness about using energy-efficient appliances and to increase the use of pre-pay domestic users in Honiara and outstations.

3.4 Commercial and business sectors

The commercial and business sectors are large consumers of electricity. In 2010, 50.72% of the electricity generated was used by the commercial sector, while the remaining percentages are shared among the government and the industrial and domestic (residential) sectors (Figure 1). The electricity consumption for the business sector continued to increase in 2012 to 57.72%. Therefore, it is important that EE and EC measures are put in place to reduce electricity consumption in this sector, measures like those in the industrial and government led initiatives: lighting improvement, cooling load improvement, building insulation, AC unit retrofits, and equipment retrofits and improvements. There is potential for awareness raising on EC measures, as well as on introducing energy-efficient appliances and equipment.



Source: SPC data (2014)

3.5 Appliances and equipment

To achieve significant energy savings in this sector, government recognises the need for appliance labelling and standards. The MMERE, with support from SPC, is working towards legislating minimum energy performance standards (MEPS) and energy rating labels for high energy consuming appliances such as refrigerators, fridges, air conditioners and lights. MEPS prevent inefficient products from entering the country and labelling allows buyers to look for the most efficient products available on the market.

According to a 2011 SPC study, *Costs and benefits of introducing standards and labels for electrical appliances in Pacific Island countries*, a saving of approximately 22 million litres in diesel fuel and 9.8 GWh of electricity would be realised in Solomon Islands if labelling and standards are enforced for air conditioning units, refrigerators, freezers and lights (Table 2).

Table 2: Potential savings through MEPS and energy rating labels of selected appliances in Solomon Islands

Population (2013)	566,000
Electrification rate (2013)	14%
Number of electrified households (2013)	14,150
Average electricity use in electrified households (2013)	1,024 kWh/yr
Potential annual savings per household by 2028	187 kWh/yr
Potential % savings from non-household uses	8%
Potential annual electricity saving in 2028, all electricity users	9.8 GWh
Potential generation fuel savings, 2013–2028 (all users)	22 million litres
Potential generation fuel cost savings 2013–2028	USD 17 million
Potential emission saving 2013–2028	61 KtCO ₂ -e

Source: *Costs and benefits of introducing standards and labels for electrical appliances in Pacific Island countries (2011)*, George Wilkenfeld and Associate, and subsequent special analysis for Solomon Islands

3.6 Transport

The transport sector is heavily dependent on petroleum fuels and in 2011 it accounted for 42% of fuels consumed in the country, yet EE initiatives in the transport sector have been neglected over the years and urgent policy attention is needed. Good transport planning and infrastructure contributes to efficient use of energy. There are a number of initiatives that could be put in place, such as controls on vehicle standards, improved road maintenance, better licensing of buses, and provision of incentives for energy-efficient vehicles. A proper institution with a legal mandate is required to make progress on EE initiatives in this sector.

The Ministry of Infrastructure and Development has a *National Transport Plan 2011–2030* with a three-year action plan that will be reviewed annually. A key focus of this plan is to improve the resilience of the transport network to the effects of climate change. This will be addressed through improved design standards and the selection of projects that help to protect both the transport network and inhabited areas. Providing transport access for individual communities and localities will be based on providing the most economically efficient and appropriate means of transport for them.

As previously mentioned, government's incentives and taxes will be required to boost vehicle efficiency and accelerate the market penetration of new, efficient vehicle technologies.

While investigations into the use of bio fuels were mainly for trial purposes and have little economic merit, another source of fuel relatively untapped is LPG (liquefied petroleum gas). The predominant domestic use of LPG is currently household cylinder gas; however, the use of this gas in the transport sector is relatively under-developed. While LPG would still be an imported fuel, it allows Solomon Islands to diversify its sources of energy and it is also more environmentally friendly than other fossil fuels.

Concessions for imported vehicles that use LPG would encourage the use of this fuel.

3.7 Summary of strategies and actions

Table 3: Strategies and action plan for energy efficiency and conservation for 2014–2019

Activities	Stakeholders	Planned outputs	Indicator of achievement	Cost (SBD)
Policy statement 1: Promote EE and EC measures at the government, residential, commercial and businesses sectors Strategy 1.1: Encourage demand side management and ensure the transformation towards a more efficient use of energy				
1.1.1 Inception and planning workshop on EE initiatives	<ul style="list-style-type: none"> ▶ ED ▶ SIEA ▶ Statistics and planning office ▶ Civil engineers ▶ Retailers ▶ EESCOs ▶ Commercial and industrial sectors ▶ Non-government organisations (NGOs) 	<ul style="list-style-type: none"> ▶ Workshop on EE & EC initiatives undertaken 	<ul style="list-style-type: none"> ▶ At least 30 participants attended the EE workshop ▶ Network of EE stakeholders established ▶ An M&E plan for the EE initiatives finalised 	\$43,512.66
1.1.2 Capacity development of energy officers in EE initiatives	<ul style="list-style-type: none"> ▶ Energy Department ▶ SIEA ▶ Civil engineers ▶ Retailers ▶ RESCOs 	<ul style="list-style-type: none"> ▶ Energy staff including personnel from the private sector trained in energy auditing ▶ Energy attaché hired ▶ Energy audit equipment procured 	<ul style="list-style-type: none"> ▶ At least five staff from ED and private sectors accredited as energy auditors ▶ At least ten personnel from the private sector are accredited as energy auditors ▶ MMERE buildings audited with report available ▶ Five energy attachés hired and working at ED ▶ Energy audit equipment is used in at least five energy audits by ED. 	\$553,797.47
1.1.3. Collect and collate relevant energy consumption data to identify energy trends and inefficiencies and develop EE targets	<ul style="list-style-type: none"> ▶ ED ▶ National Planning ▶ MMERE ▶ Customs ▶ Petroleum companies 	<ul style="list-style-type: none"> ▶ Support from oil companies, Customs Department, government ministries ▶ Realistic EE targets developed and implemented 	<ul style="list-style-type: none"> ▶ SI energy balance established ▶ EE targets established ▶ SI centralised database portal established 	\$909,810.13
1.1.4. Development of awareness materials	<ul style="list-style-type: none"> ▶ ED ▶ Civil societies 	<ul style="list-style-type: none"> ▶ EE and EC awareness materials developed and printed 	<ul style="list-style-type: none"> ▶ Printed copies of posters, booklets and pamphlets available in English and local languages 	\$474,683.54

GOVERNMENT-LED INITIATIVES					
Activities	Stakeholders	Planned outputs	Indicator of achievement	Cost (\$BD)	
1.1.5. Carry out energy audits in buildings of the 27 ministries	27 ministries and staff SIEA ED	Energy audits undertaken in government buildings of the 27 ministries.	Five energy audits per year undertaken Energy audit reports for the government buildings available	\$961,234.18	
1.1.6. Conservation efforts in government buildings	27 ministries and staff SIEA ED	Half-day workshop on EE initiatives undertaken, targeting government ministries Awareness materials disseminated Government competition on EE initiatives undertaken	At least 30 participants attended the workshop Support and active participation from the government ministries in undertaking EE and EC initiatives Increased knowledge and awareness of EE and EC initiatives enhanced from accessing the disseminated materials ² Top four energy efficient buildings identified, with the winners announced Target savings in electricity consumption achieved from the government ministries	\$395,569.62	
1.1.6. EE efforts in government buildings	27 ministries and staff SIEA ED	Replacement of 4 ft tube lights to LED type undertaken Cooling load improvements in government buildings undertaken Office appliance improvement and retrofits undertaken	11076 tube lights replaced as part of the lighting improvement programme Target savings in electricity consumption in cooling loads achieved from the government ministries Target savings in electricity consumption for the office appliance improvement achieved from the government ministries	\$13,747,191.16	
COMMERCIAL AND INDUSTRY- LED INITIATIVES					
Activities	Stakeholders	Planned outputs	Indicator of achievement	Cost (\$BD)	
1.1.7 Energy survey of major commercial and industrial buildings	ED Commercial and industrial buildings	Commercial and industrial buildings surveyed	At least 600 buildings from the commercial and industrial sector surveyed	\$158,227.85	
1.1.8 Workshop on enabling financial initiatives and mechanisms for EE improvements	ED Commercial and development banks Private sector – civil engineers, retailers, hotels	Workshop undertaken	At least 30 participants attended the workshop Successful involvement of the banks as part of the retrofit loan programme	\$37,822.78	

2 This activity will include having a survey undertaken in 2014 to gauge the knowledge of government workers on EE and EC initiatives. A follow-up survey or annual surveys will be undertaken to gauge progress.

1.1.9 Energy audit of commercial and industrial buildings	<ul style="list-style-type: none"> ▶ ED ▶ Commercial and industrial buildings 	<ul style="list-style-type: none"> ▶ Commercial and industrial buildings audited 	<ul style="list-style-type: none"> ▶ At least 100 buildings from the commercial and industrial sector audited with reports available 	\$1,977,848.10
1.2.0 EE initiatives in the commercial and industrial sector	<ul style="list-style-type: none"> ▶ ED ▶ Commercial and industrial buildings 	<ul style="list-style-type: none"> ▶ Lighting replacement programme – 4 ft and 2 ft tube lights endorsed and implemented ▶ Cooling load improvement programmed endorsed and implemented ▶ Office appliance improvements and retrofit programme endorsed and implemented 	<ul style="list-style-type: none"> ▶ 943 4 ft tube lights replaced as a result of the programme ▶ 786 2 ft tube lights replaced as a result of the programme ▶ Target savings in electricity consumption in cooling loads achieved from the commercial and industrial buildings ▶ Target savings in electricity consumption for the office appliance improvement achieved from the commercial and industrial buildings 	\$7,911,392.41
RESIDENTIAL SECTOR				
Strategy 2.2: Ensure wider public engagement in energy efficiency				
1.2.1 Conduct energy EE and EC workshops and advocacy activities in communities	<ul style="list-style-type: none"> ▶ Provincial councils in Auki, Giso, Noro, Buala, Kirakira and Lata ▶ ED ▶ Community leaders ▶ NGOs ▶ SIEA 	<ul style="list-style-type: none"> ▶ EE and EC workshops undertaken ▶ Demonstration audits undertaken at households as part of the workshop ▶ Contributed to provincial and national events in advocating EE and EC initiatives 	<ul style="list-style-type: none"> ▶ Nine workshops undertaken in nine provinces ▶ At least 270 participants from the nine provinces attended the workshops ▶ At least 270 household energy audit reports collated and analysed for household energy consumption needs ▶ Articles of advocacy activities in the media 	\$411,392.41
1.2.2 Integrate EE & EC in school curriculum at primary and secondary levels	<ul style="list-style-type: none"> ▶ Ministry of Education ▶ ED ▶ SIEA 	<ul style="list-style-type: none"> ▶ EE & EC concepts is part of the school curriculum ▶ Demonstration audits in selected schools undertaken 	<ul style="list-style-type: none"> ▶ Revised text book available for primary and secondary schools on EE and EC concepts ▶ Energy auditing taken up as part of the school laboratory work for physics and engineering students in high schools ▶ Number of schools teaching EE and EC concepts 	\$158,227.85
1.2.3 EE & EC advocacy activities	<ul style="list-style-type: none"> ▶ SIEA ▶ ED ▶ Town councils, NGOS ▶ Provincial councils 	<ul style="list-style-type: none"> ▶ Hosted awareness day activities in celebration of global events – Earth Day, Earth Hour, Environment Day, etc. ▶ Contributed to national and provincial seminars, symposiums and workshops ▶ TV ads and radio spots on EE and EC initiatives aired 	<ul style="list-style-type: none"> ▶ Hosted two annual energy events in a year ▶ Participated in at least five national and provincial workshops ▶ TV ads aired on national TV ▶ Radio spot ads aired 	\$1,740,506.33
1.2.4 Buy one get one free CFL promotion	<ul style="list-style-type: none"> ▶ SIEA ▶ ED 	<ul style="list-style-type: none"> ▶ Funding acquired ▶ Programme endorsed and implemented 	<ul style="list-style-type: none"> ▶ 18,614 free CFL bulbs distributed by 2019 ▶ Significant reduction in evening load 	\$744,541.17

1.2.5 Household electricity bill rebate initiative	<ul style="list-style-type: none"> ▶ SIEA 	<ul style="list-style-type: none"> ▶ Programme endorsed and implemented 	<ul style="list-style-type: none"> ▶ Software and equipment procured and used by SIEA ▶ At least 1000 households are awarded by the bill rebate awards 	\$4,781,835.44
1.2.6 Household energy efficient retrofit loans	<ul style="list-style-type: none"> ▶ ED ▶ Bank 	<ul style="list-style-type: none"> ▶ Programme endorsed and implemented 	<ul style="list-style-type: none"> ▶ Loan financing arrangement handled by the bank ▶ At least 50 households benefited from the loan scheme 	\$791,139.24
Policy Statement 3: Encourage energy efficiency in appliances, equipment and technologies				
Strategy 3.1: Ensure there are appropriate standards, guidelines and tax incentives for the use of energy efficient appliances, equipment and technologies				
3.1.1 Develop through legislation of minimum energy performance standards and labelling for electrical appliances, such as fridges, freezers, air conditioning units and lights	<ul style="list-style-type: none"> ▶ ED ▶ SIEA ▶ AG's Chambers ▶ Customs Department ▶ SPC 	<ul style="list-style-type: none"> ▶ Relevant acts (Electricity Act & Customs Act) amended and enforced ▶ Record of imports of energy-efficient products at Customs Department 	<ul style="list-style-type: none"> ▶ Legislation supporting MEPS and labelling is in place and enforced 	\$10,255,610.89
3.1.2 Identify and implement tax incentives for energy-efficient appliances, equipment and technologies	<ul style="list-style-type: none"> ▶ ED ▶ SIEA ▶ Customs Department ▶ Ministry of Finance ▶ Infrastructure and Development ▶ Land Transport Authority ▶ SPC 	<ul style="list-style-type: none"> ▶ Assessment of government taxes on energy-efficient appliances and technologies ▶ Review of the existing legislation to integrate energy-efficient appliances, equipment and technologies 	<ul style="list-style-type: none"> ▶ Tax incentives in place on the use of energy efficient vehicles including LPG vehicles ▶ Tax incentives for energy efficient appliances, equipment, and technologies 	\$118,670.89
3.1.3 Collaborate with relevant agencies on the use of efficient cooking and heating technologies	<ul style="list-style-type: none"> ▶ Department of Energy ▶ NGOs ▶ Ministries of Agriculture, Environment, Health, Education 	<ul style="list-style-type: none"> ▶ Construction of efficient biomass cooking stoves is taught at vocational rural training centres ▶ A pilot biogas demonstration is constructed 	<ul style="list-style-type: none"> ▶ At least 4,000 households are using energy efficient biomass stoves in urban centres 	\$791,139.24

Table 1: Implementation plan and timeline

Activities	2014	2015	2016	2017	2018	2019
ELECTRICITY SECTOR						
Supply side activities (relevant to the electric sector urban sub-sector)	Develop and implement activities	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
GOVERNMENT-LED INITIATIVES						
Data collection & collation	Collect electricity/energy sector data for govt and other sectors	Ongoing data collection	Develop EE and EC targets	Ongoing data collection and collation and refine EE targets	Ongoing data collection and collation and finalise EE targets for inclusion in the 2020 revised strategy	Ongoing
Government awareness	Develop and implement awareness campaigns for all government agencies	Awareness in all 27 ministries completed	Continuously improve campaign to raise awareness for government workers	Continuously improve campaign to raise awareness for government workers	Ongoing awareness	Ongoing awareness
1-3 months demo at MMERE on efficient lights	Demo completed & savings quantified					
Strengthening capacity and resources for the Energy Office in implementing SIG energy initiatives						
Workshop to roll out the EE initiatives and programmes	Proposal for funding is developed once strategy approved by Cabinet	Workshop convened				
Training of energy staff	Training of energy staff	Training of energy staff and private sectors	Training of energy staff and private sectors	Training of energy staff and private sectors	Training of energy staff and private sectors	Training of energy staff and private sectors
Hiring of energy attaches	Hire of attaches	Hire of attaches	Hire of attaches	Hire of attaches	Attaches recruited by ED	
Recruitment of EE specialist	Energy specialist recruited	Energy specialist recruited	Energy specialist	Energy specialist recruited	Energy specialist recruited	Energy specialist recruited
Procurement of energy auditing equipment	Procurement of energy auditing equipment	Procurement of energy auditing equipment				

Energy data collection activities for the central database	Energy data collection	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Establishment of SI central database portal	Central Database developed	Central Database maintained and updated	Central database maintained and updated	Central database maintained and updated	Central database maintained and updated	Central database maintained and updated
Development of advocacy materials	Advocacy materials developed	Advocacy materials disseminated	Advocacy materials disseminated	Advocacy materials disseminated	Advocacy materials disseminated	Advocacy materials disseminated
Energy audits for 27 ministries	Undertake EE workshop in the SI targeting government sectors	Audit commences with 5 audits per year	Ongoing audit and implement recommendation	Ongoing audit and implement recommendation	Ongoing audit and implement recommendation	Ongoing audit and implement recommendation
Prepare policy brief for reduction in energy consumption of all government offices	High-level endorsement on reduction in energy use	Ministries to begin implementing reduction strategies	Ongoing implementation and evaluation	Ongoing implementation and evaluation	Ongoing implementation and evaluation	Ongoing implementation and evaluation
COMMERCIAL AND INDUSTRIAL SECTOR INITIATIVES ON ENERGY EFFICIENCY						
Energy survey of major commercial and industrial buildings	Roll out of energy surveys for commercial and industrial buildings	Reports drafted on energy consumption per building	Reports drafted on energy consumption per building	Reports drafted on energy consumption per building	Reports drafted on energy consumption per building	Reports drafted on energy consumption per building
Workshop on enabling financial initiatives for EE improvements at residential, commercial and industrial buildings	Planning of workshop using data collected	Workshop delivered – using case study on and buildings audited	Energy audits	Energy audits	Energy audits	Energy audits
Energy audit of Commercial and industrial buildings	Energy audits	Energy audits	Energy audits	Energy audits	Energy audits	Energy audits
EE initiatives in the commercial and industrial sectors	Implement energy audit reports	Implement energy audit reports	Implement energy audit reports	Implement energy audit reports	Implement energy audit reports	Implement energy audit reports
PUBLIC AWARENESS – RESIDENTIAL SECTOR						
Awareness campaign	Awareness on labelling and standards to commence	Commence general energy awareness in Honiara and the provinces with public launches	Improve campaigns to raise awareness	Improve campaigns to raise awareness	Improve campaigns to raise awareness	Improve campaigns to raise awareness

Energy audits in households, institutions, industries	Seek financial support to carry out audits	Commence auditing	Ongoing audits & implement audit recommendations	Ongoing audits & implement audit recommendations	Ongoing audits & implement audit recommendations
EE & EC in school curriculum	Curriculum & learning materials development begins	Trialling of curriculum in selected schools	Trialling & refining curriculum	Roll-out in schools begins	Ongoing
APPLIANCES, EQUIPMENT AND TECHNOLOGIES					
Regulations for labelling and standards on refrigerators and freezers	Regulations to be developed and approved; awareness and training to start	Ongoing	Evaluate the effectiveness of the programme	Improve compliance and enforcement Ongoing implementation	Ongoing mandatory implementation
Replacement of inefficient lights	Identify and replace	Ongoing	Ongoing	Ongoing	Ongoing
Tax incentives for energy efficient appliances, equipment and technologies	Vehicle data collection, collation, and meetings to prepare submission for high level endorsement	Assessment of equipment for tax incentives Discussions, submissions and approval	Tax incentives in place for efficient vehicles	Tax incentives in place for efficient vehicles	Tax incentives in place for efficient vehicles
Demonstrations on energy-efficient cooking technologies	Develop partners with NGOs, Provincial centres and investors on use of efficient technologies	Collaborate with vocational rural training centres for courses on construction of cook stoves Collaborate with NGOs for biogas demonstration	Cook stove construction courses included in at least one training centre Continue discussions	Ongoing training	Ongoing training

Table 2: Priority activities

POWER UTILITIES (relates to electric urban sub-sector activities)	Increase power generation efficiency and reduce losses Carry out supply side management activities, including auditing of SIEA power station and installations of cooling systems and new generators
GOVERNMENT LED INITIATIVES	Extensive data collection and collation Energy audits of government-owned buildings <ul style="list-style-type: none"> ➤ Government energy awareness programmes ➤ Lighting improvements ➤ Mentoring and strengthening capacity of government officials on implementation of this strategy.
COMMERCIAL AND INDUSTRIAL SECTOR INITIATIVES	Energy auditing, cooling load improvements – building insulation and AC unit retrofits, monitoring and EC efforts, EE improvements – equipment retrofits and lighting improvements and capacity development
PUBLIC AWARENESS – RESIDENTIAL SECTOR	<ul style="list-style-type: none"> ➤ Energy awareness programmes in Honiara and provincial centres ➤ Tax incentives on the use of energy-efficient lights ➤ Household energy efficient retrofit loan systems established ➤ Household electricity bill rebate initiative
APPLIANCE AND LABELLING PROGRAMMES, EQUIPMENT AND TECHNOLOGIES	<ul style="list-style-type: none"> ➤ Energy labelling and standards for freezers, refrigerators, lights and air conditioners; ➤ Tax incentives on the use of energy efficient vehicles (including LPG vehicles) and cooking technologies

3.8 Energy efficiency targets

The level of EE in Solomon Islands is, as elsewhere, characterised by many different factors; no single indicator can provide a complete picture of a nation's energy efficiency. In 2012 the American Council for an Energy Efficient Economy analysed the energy efficiency levels of 12 of the world's largest economies using 27 qualitative and quantitative indicators to provide an indication of overall EE in these countries. The indicators cover four main areas: national efforts, buildings, industry and transportation. SPC's *Framework for Action on Energy Security in the Pacific* (FAESP) developed 36 indicators of which five relate to EE. These indicators include energy intensity of the economy (MJ/USD), electric power generation efficiency (kWh/l), distribution losses (%), the existence and scope of appliance labelling, and the existence and scope of mandated EE standards.

In 2010 the United Nations Secretary General launched the Sustainable Energy for All initiative with three complementary objectives to be achieved by 2030. One of the objectives is to double the rate of improvement in energy efficiency.

Whilst government recognises the importance of EE, there is currently a lack of EE data to establish meaningful targets. Comprehensive data collection and establishing national efficiency targets will be carried out as part of this strategy. These targets and implementation plan will be included in the revised strategy from 2020 and beyond.

SIEA presented the following plans and activities at the National Energy Forum conducted as part of developing this strategy.

- Improve on the cooling radiators for the LT Wartisila Lungga generators (gain 2.5 Mw).
- Carry out major overhauls on L10 Niigata, L9 Mitsubishi and L8 Wartsila.
- Install 2 x 1.5 Mw diesel generators at Honiara Power Station by December 2013.
- Install 2 x 5.0 Mw diesel generators at Lungga Power Station by 2015/2016.
- Carry out energy auditing at main stations in Lungga to reduce station energy usages.

According to SIEA Kema report 2012, SIEA's system energy losses are 22.91% of annual generation, which is a very high percentage. These losses are used here as baseline data and energy supply side targets that SIEA could improve on. A summary of energy efficiency targets from supply side management is provided in Table 5.

Table 3: A summary of energy efficiency targets from supply side management

	Baseline	Targets		
	2009	2015	2017	2019
1.1 Improvement in generation efficiency				
➤ Station losses (%)	2.89 (2012)	na	na	<2.89
1.2 Improvement in the distribution line losses				
➤ Technical losses (%)	5.85 (2012)	na	na	<4
➤ Non-technical losses (%) ³	17.05 (2012)	na	na	<4

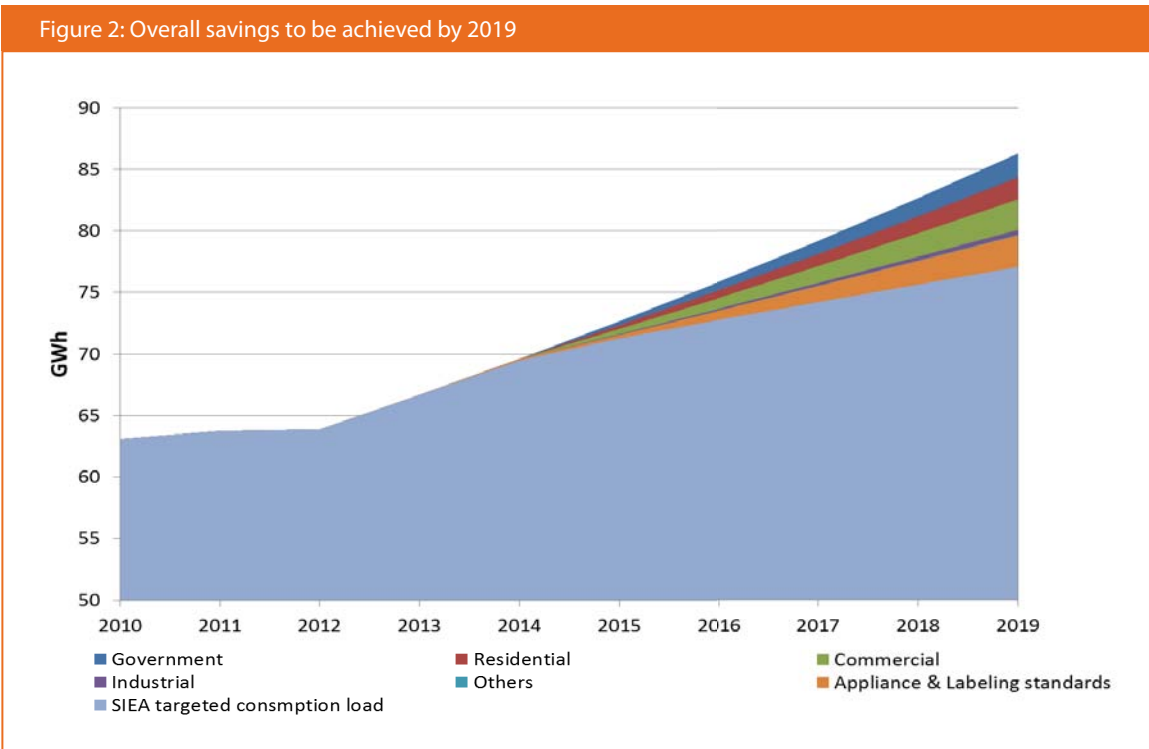
Tables 6 and 7 provide more details about EE targets, with estimated electricity growth of 4.39% based on the years 2009 to 2011 and electricity growth demand for the next five years. Table 6 provides past actual data on electricity consumption for the different sectors – domestic/residential, government, commercial, industrial and others – and forecasted electricity consumption. The activities listed in Table 7 are to be implemented by SIEA and ED and other relevant stakeholders, with ED as the coordinating agency.

Table 4: Energy efficiency targets

Main target: Reduce electricity consumption in all sectors by 10.7% (9.2 GWh) by 2019. This is equivalent to annual fuel generation cost saving of USD 1.75 million achieved by 2019 (*Electricity consumption growth 4.39%, electricity generation costs of USD 0.19/kWh*).

Unit - kWh	2010	2011	2012	Forecasted 2019 consumption	Targeted reduction in electricity consumption	Targeted savings to achieve by sector by 2019	Overall contribution to SI DSM
Residential	13,128,198	12,902,309	13,141,960	17,754,825	1,775,483	10%	2.1%
Government	8,216,545	6,811,535	7,214,272	9,746,502	1,949,300	20%	2.3%
Commercial	32,001,932	37,646,276	36,866,547	49,806,809	2,490,340	5%	2.9%
Industrial	7,818,888	5,452,203	5,898,450	7,968,823	398,441	5%	0.5%
Others	1,924,385	936,247	751,964	1,015,905	50,795	5%	0.1%
General appliance & labelling standards	na	na	na	na	2,561,642		3.0%
Total	63,089,948	63,748,570	63,873,193	86,292,865	9,226,001		10.7%

³ Non-technical losses may include unbilled usage such as utility's own building usage, energy used by pumps for the water and sewer systems, street lights, etc.



Source: SPC Data (2014)

Table 5: Activities needed to achieve the targets

1. Lighting improvements	Typical ratings	EE improved ratings	Estimated hours of operation per day	Number of appliances to be replaced	Savings to be achieved by 2019 (kWh)
Replacing 4 ft florescent tube lights with LED tubelights in the government sector*	45	20	8	11076	584790.11
Replacing 60 watt incandescent bulbs with 11 watt CFL bulbs in the residential sector	60	11	4	18614	1331611.89
Replacing 4ft florescent tube lights with 4 ft LED tubelights in the commercial sector	45	20	8	943	49806.81
Replacing 2 ft florescent tube lights with 4 ft LED tubelights in the commercial sector	25	10	8	786	24903.40
Improving lighting efficiency in industrial building	80	40	6	314	19922.06

*The number of buildings targeted in the government sector refers to the 27 ministries. According to SIEA customer data 2012, there are 215 metered customers in the government sector.

2. Cooling load improvements - building insulation and AC unit retrofits, monitoring and EC efforts	Target reduction in cooling consumption load per day (kWh)	Number of days in year	Number of buildings targeted	Savings to be achieved by 2019 (kWh)
Government ministries (27)	125	264	27	877185.17
commercial buildings	10	264	519	1369687.26
Industrial buildings	15	264	40	159376.45

3. EE improvements – equipment retrofits and improvement ⁴	Target reduction in electricity consumption per day (kWh)	Number of days in year	Number of buildings targeted	Savings to be achieved by 2019 (kWh)
Government ministries (27)	55	264	27	389860.08
commercial buildings	3	264	1006	796908.95
Industrial buildings	12	264	63	199220.57
Other sectors	2	365	70	50795.27

4. Awareness and promotion - EC efforts	Target reduction in electricity consumption per day (kWh)	Number of days in year	Number of buildings targeted	Savings to be achieved by 2019 (kWh)
Residential sector	0.25	365	4864	443870.63
Government ministries	13.5	264	27	97465.02
commercial buildings	1	264	943	249034.05
Industrial buildings	2	264	38	19922.06

5. Appliance & labelling standards	Savings to be achieved by 2019 (kWh)			
	Refrigerators	Freezers	Air conditioners	Lighting
Residential	404262.10	180932.51	128628.51	615901.45
Commercial	144931.40	0.00	507259.91	579725.62

Source: *Costs and benefits of introducing standards and labels for electrical appliances in PICs*. 2011. George Wilkenfeld and Associates, and a subsequent special analysis for Solomon Islands

4 Equipment retrofit and improvement targets computers, printers, fax machines, servers, kitchen appliances, shredders, UPS, and other associated electrical equipment used in buildings.

3.9 Investment costs to meeting the targets

Investment or capital costs required for achieving the above targets are provided in Table 8. This is further explained in section 4. indicative figures to see to the successful implementation of the EE-EC-SIP in the vicinity of SBD49,733,141 million dollars or USD 6.75 million dollars taken at an exchange rate of 0.1264 USD/SBD. This costs does not include the SIEA EE activities as these are provided in the SIEA Development Strategic plan 2014–2016.

Table 6: Summary of costing in meeting the targets

1. Strengthening capacity and resources for the Energy Office in implementing the SIEE-EC-SIP	Number of Staff targeted	Consultancy and associated hiring costs (SBD)	Hardware and associated retrofit costs (SBD)	Total estimated costs (SBD)	Comments
Workshop for energy staff on EE and EC initiatives	10	\$39,556.96	\$3,955.70	\$43,512.66	The workshop will cover the concepts of EE and EC, reflecting on experiences in PICs. The workshop is partly an inception workshop for the strategic plan in also preparing for the other activities – energy survey questionnaires, advocacy material ideas, and data collection requests. The workshop should include all the energy staff and stakeholders in SI. Duration of workshop – 1 week. Finance breakdown: airfare and DSA – USD 2000; fees – USD 1000; workshop catering and materials – USD 2500.
Training of energy staff in energy auditing	10	\$79,113.92	\$7,911.39	\$87,025.32	The training will be undertaken twice, once in 2015 and once in 2017. The second training will be a refresher training. Targeted participants will be the EE team from the energy office, civil engineers from the private sector and major retailers. Energy audit training will be comprehensive and will include accreditation. As part of the training, a detailed audit of government ministries will be undertaken. A one month training to include face-to-face sessions (one week), with practical auditing (three weeks). Finance breakdown per training: airfare and DSA – USD 2000; fees – USD 2000; workshop catering and materials – USD 1500.
Hiring of energy attachés	5	\$348,101.27	\$0.00	\$348,101.27	As part of the government capacity building programme, five additional attachés will be recruited on an annual basis to assist the EE team in the implementation of the activities. Skills required for the team should be as follows: graphic artist - 1, economist - 1, engineers - 3. Consideration should be given to the private sector to be part of the team as part of capacity building in establishing a business. Attachés fees = USD 10 X 5 days X 44 weeks X 5 attachés X 4 years
Recruit energy specialist for SI	1	\$2,768,987.34	0	\$2,768,987.34	In order to progress the EE programme, it is recommended that a consultant or adviser be recruited, who could provide capacity development and training as well as lead the work on EE initiatives. A GEF-6 proposal is recommended for implementing this strategy.

Procurement of energy auditing equipment	na	na	\$118,670.89	\$118,670.89	Procurement of energy audit equipment to assist the Energy Office in auditing buildings. As part of developing experts in the private sector to establish energy auditing as part of their services, the equipment will be hired out to them as well. Selected lists include - infrared cameras, infrared thermometers, multimeters, amp meters, energy watt meters, energy meters; KWh meters, and light meters. Total estimated cost of USD 15,000 is needed for all the equipment.
Energy data collection activities for the central database	4	\$118,670.89	\$0.00	\$118,670.89	This activity looks at strengthening the relationship of the Energy Office with other government ministries, departments and key private sector stakeholders as part of collecting and compiling energy data and information. This will include holding a number of meetings and lobbying for the Energy Office to be board members in key areas within government. Associated cost breakdown include: travel and DSA cost – USD 10000 x 4 years; meetings - USD 5000 X 4 years.
Establishment of the SI central database portal	4	\$316,455.70	\$474,683.54	\$791,139.24	The work is to be undertaken in collaboration with the Solomon Islands Government IT team in outsourcing the services to establish the SI energy database portal. Associated cost indicated: consultancy fees - USD 40000; hardware and software costs - USD 60,000.
Development of advocacy materials	4	\$79,113.92	\$395,569.62	\$474,683.54	This covers the activities in developing awareness materials: posters, pamphlets, booklets, etc. for advocacy activities. Associated cost includes hired services - cartoonist, graphic designer USD 2000 x 5 years; associated printing cost USD 8,000 x 5 years; procurement of supporting tools for advocacy work - InDesign software, camera, desktop computer with 29 inch screen - USD 10,000.
				<u>\$1,981,803.80</u>	

3. Prospective investments for initiatives on EE & EC led by commercial and industrial sectors	Number of buildings targeted	Consultancy and implementation cost (SBD)	Hardware and associated retrofit costs (SBD)	Total estimated costs required (SBD)	comments
Energy survey of major commercial and industrial buildings	> 600	\$158,227.85	na	\$158,227.85	Activity contributes to data collection activity 1 above. Associated costs estimated at USD 20000.
Workshop on financial supporting mechanisms for EE improvements.	na	\$25,955.70	\$11,867.09	\$37,822.78	1-2 day workshop focusing on financial investment opportunities in EE application, economic evaluation and proposal vetting, targeting the banking institutions and the private sector. Associated costs: consultant's travel and DSA - USD 16000; fees - USD 6,000; workshop catering and materials - USD 2000.
Energy audit of commercial and industrial buildings	100	\$1,977,848.10	na	\$1,977,848.10	Service fee for energy auditor to audit buildings. Energy Office to promote number of private auditor's available. As part of the programme, a co-financing support will be provided by the Energy Office. Co-financing support is estimated at USD 2500 X 100 buildings for the five years. Opportunity to work with the bank in supporting the EE retrofitting activities with the private sector.
Lighting replacement programme – 4 ft tube lights replacement	na	Special loan scheme	Special loan scheme	\$7,911,392.41	Loan financing scheme to work with the banks in providing loans with added benefits in promoting the programme, such as financing and interest-reduced loan options. The loan option is to add value to the World Bank guarantee commitment option. Targeted amount for the commercial sector funds estimated at USD 1,000,000.00.
EE efforts – cooling load improvements	na	Special loan scheme	Special loan scheme		
EE efforts – office appliance improvements and retrofits	na	Special loan scheme	Special loan scheme		
				\$10,085,291.14	

4. Public awareness investments for residential sector	Consultancy and implementation cost per activity (SBD)	Hardware and associated retrofits (SBD)	Total estimated costs required (SBD)	Comments
Mainstreaming EE and EC in energy and gender activities and workshops	\$379,746.84	\$31,645.57	\$411,392.41	Contribution to national and community workshops targeting the 9 provinces. Allocation to include a day to cover basic energy auditing for the domestic household. Training to be undertaken by energy officer in local dialect. Training if possible to be mainstreamed into renewable energy training as well. Provincial workshops to be undertaken in two phases: 2015 and 2018. Associated costs include: travel and DSA USD 2000 X 12 site visits X 2 missions; workshop and presentations USD 4000.
Mainstreaming EE and EC in activities into the school curriculum.	\$158,227.85	na	\$158,227.85	Activity involves working with the Ministry of Education in developing a curriculum in the primary and secondary schools in the basic science and physics subjects. This involves consultations, workshops and text book development in English with translation into the local language. Associated costs of support work to the curriculum are estimated at USD 20,000.
Awareness advocacy – contribution to national events and seminars	\$791,139.24	na	\$791,139.24	Associated cost of hosting and supporting events in Solomon Islands. Some of the potential events include - Earth Day and Environment Day. This also contributes to national seminars, symposiums and workshops. Targeted activities to be undertaken from 2015 to 2019. Annual estimate: USD 20000 x 5 years.
Awareness advocacy – TV and radio advertisements	\$949,367.09	na	\$949,367.09	Associated cost of airing TV ads on EC activities. Targeted activities to be undertaken from 2015 to 2019. Hiring of advertisement company to develop ads – USD 15,000; annual airing of ads – USD 30,000 X 4 years.
Buy get one free CFL light bulb initiative	na	\$744,541.17	\$744,541.17	Promotional activity to switch to CFL bulbs. This includes buying one and getting one free. Total associated cost to purchase 18614 bulbs to be promoted is estimated at SBD 744541.17. This will eventuate into a savings of SBD 7.9 million with SIEA over the lifetime of the CFL bulbs.
Household electricity bill credit initiative	\$4,781,835.44	na	\$4,781,835.44	This covers the promotional activities in awarding households with a bill credit of USD 10 as an award for dropping their consumption by an average 10 kWh over three months. The activity is to be undertaken in close collaboration with SIEA. This may also include reviewing and adding comparative information into the SIEA electricity bill for sharing awareness. Estimated costs: software and associated equipment for identifying and tagging successful customers – USD 20,000; additional inputs to the SIEA electricity bill – USD 15,000; award money and recharge coupon prizes – USD 10 X 20,000 prices over 3 years.

Household energy efficient retrofit loans	Special loan scheme	Special loan scheme	\$791,139.24	Loan financing scheme to work with the banks in providing loans with added benefits in promoting the programme such as co-financing and interest-reduced loan options. The loan option is to add value to the World Bank guarantee commitment option. Targeted amount for the commercial sector funds estimated at USD 100,000.
			\$8,627,642.44	
5.Regulations and standards investments for energy-efficient products				
	Consultancy and implementation cost per activity (SBD)	Hardware and associated retrofits (SBD)	Total estimated costs required (SBD)	Comments
Appliance labelling and standards programme (includes training and legislation development) targeting refrigerators, freezers, air conditioners and lighting	\$1,456,091.77	\$8,799,519.11	\$10,255,610.89	Associated costing as referenced from <i>Costs and Benefits of Introducing Standards and Labels for Electrical Appliances in PICs</i> (2011), George Wilkenfeld and Associates, and subsequent special analysis for Solomon Islands.
Study of the costs and benefits of introducing fiscal or financial incentives for energy-efficient appliances and vehicles	\$118,670.89	na	\$118,670.89	Associated cost to undertake study. Travel and DSA – USD 5,000; fees – USD 10,000.
Efficient biomass stove cooking	\$791,139.24	na	\$791,139.24	4,000 households using energy-efficient biomass EZY stoves at a cost of USD 25 per EZY stove by 2019.
			\$11,165,421	

4.0. Energy efficiency policies, strategies and outcomes

Within the five years of implementing the policy strategies, a number of outcomes are expected.

Policy 1 : Promote energy efficiency and conservation measures in the electricity sector

Strategy 1.1: Encourage supply side management

O1.1: Improve diesel power generation efficiency by at least 4 kWh/l from 2009 level¹

Policy 2: Promote energy efficiency and conservation measures in the government, residential, commercial and business sectors

Strategy 2.1: Encourage demand side management and ensure transformation towards a more efficient use of energy

O2.1: Reduce electricity consumption in government services by 20% from 2012 level, while increasing efficiency of service delivery by 2019

O2.2: Build a sufficient body of expertise within government in order to develop and achieve national energy efficiency targets by 2019

O2.3: Reduce electricity consumption in domestic and households level by 10% from 2012 level

O2.4: Reduce electricity consumption in commercial services by 5% from 2012 level

O2.5: Reduce electricity consumption in industrial services by 5% from 2012 level

Strategy 2.2: Ensure wider public engagement in energy efficiency

O2.6: Increase nationwide levels of awareness, leading to strong demand for energy efficiency products and services

O2.7: Include course materials on energy efficiency and conservation in the education system in primary and secondary schools by 2019

Policy 3: Encourage energy efficiency in appliances, equipment and technologies

Strategy 3.1: Ensure there are appropriate standards, guidelines and tax incentives for the use of energy-efficient appliances, equipment and technologies

O3.1: By 2019, realise electricity savings of 2.56 GWh per year from mandatory implementation of minimum energy performance standards and energy labelling for freezers, refrigerators, lights and air conditioning units

O3.2: By 2019, fully realise incentives for the purchase and use of efficient vehicles and cooking technologies

¹ Please note this is SSM and actual activities and costs are captured in the SIEA power plan and strategic action plan and are not included in the strategy due to lack of data obtained from SIEA.



PART 4: ENERGY EFFICIENCY INVESTMENT PLAN

4.1 Summary of investments required

The investments required to implement the initiatives identified under the EE-EC-SIP actions (Part 3.0) are presented in Tables 9 to 12, which also illustrate the funding requirements for these investments to take place. The identified proposals will require the involvement not just of MMERE, but also the Ministry of Finance (MOF), the Ministry of Education (MOE), SIEA, oil and gas companies, commercial businesses, NGOs and others, and co-ordinating this will require strong leadership from the EAC, which will be established to oversee the implementation of the SINEP policy and strategy and monitor progress. By working together to implement these plans, all involved in the sector can contribute to a step change in delivery of EE services for all Solomon Islanders.

Table 7: Prospective investments for government-led initiatives, businesses and industries on energy efficiency

Leading agencies responsible and participating agencies	ED, Heads of Ministries, EAC members SIEA, staff of all 27 ministries, private sector, MOE, businesses and industries
Background/ Rationale	Energy usage and expenditure is very high due to high oil prices and reliance on fuel imports. As hydro-electricity schemes will not be commissioned before 2017, in the short term demand can be reduced by promoting EE and EC measures in order to meet the goal of reducing the cost of energy supply. Government can take the lead in identifying where EE measures can be implemented and demonstrate the benefits, especially cost savings.
Objectives	<ul style="list-style-type: none"> ➤ To reduce energy use in government buildings, businesses and industries ➤ To assist in promotion of EE and EC by government acting as a leader and demonstrating the benefits
Scope of work	<ul style="list-style-type: none"> a) Carry out energy audits for 27 ministries and implement audit recommendations progressively b) Prepare policy brief for all ministries to replace lights with efficient ones c) Collect relevant energy data to identify trends and inefficiencies and develop national EE targets d) Prepare policy brief for achieving reduction in electricity consumption of all government offices by the determined appropriate target e.g. 10% e) Conduct government awareness programmes f) Strengthen capacity and resources for the Energy Office in implementing SIG energy initiatives g) Prospective investments for government-led initiatives on EE h) Prospective investments for initiatives on EE led by the commercial and industrial sectors i) Facilitate energy auditing in institutions and commercial/industry buildings and showcase energy savings on GHG emissions and money
Benefits	<ul style="list-style-type: none"> ➤ Reduced energy use and fuel bills to government ministries, and therefore reduced cost of running government to taxpayers ➤ An example set to businesses and the public of energy-efficient appliances, contributing to raised awareness ➤ Reduced fuel import, use and emissions
Alignment with NDS	<p>Will contribute to NDS Objective 6:</p> <ul style="list-style-type: none"> a) To reduce costs and protect the environment, ensure fuel conservation and efficiency in end use of petroleum products b) Reduce energy costs by promoting EE and EC, in the context of the introduction of product standards for appliances, including appliance labelling, EE ratings and promotion of energy-efficient technology and ensure minimal negative environmental impacts of energy production, distribution and consumption
Estimated cost	<ul style="list-style-type: none"> ➤ Strengthening capacity and resources for the Energy Office in implementing the SI-EE- EC -SIP: SBD 4,750,791.14 ➤ Prospective investment for government-led initiatives on EE: SBD 15,103,994.96 ➤ Prospective investments for initiatives on EE led by the commercial and industrial sectors: SBD 10,085,291.14

Implementation period	2014–2019
Potential funding	SIG, SIEA, SPC, private sector, bilateral and international donors

Table 8: Public awareness investments in the residential sector

Responsible agency	ED, SIEA, provincial councils, NGOs, private sector
Background/Rationale	The efficient utilisation of energy and discouraging wasteful and non-productive patterns of energy consumption are vital for a country that is highly dependent on imported energy sources. Public awareness of EE and EC is very low and programmes are needed to educate people on energy saving behaviour.
Objectives	To increase public awareness of EE and EC practices, resulting in: <ol style="list-style-type: none"> i. lower fuel bills for consumers; ii. reduced total fuel use generating electricity; and iii. increase in consumers choosing to purchase energy efficient products.
Scope of work	<ol style="list-style-type: none"> a) Awareness raising campaigns to explain the benefits of saving energy and how people can do it. To be conducted through radio talk back shows, pamphlets, TV adverts, road shows, in local languages for rural and urban areas. Awareness to include public launches b) Conduct supply and demand side management activities c) EE and EC to be integrated into school curriculum
Benefits	<ul style="list-style-type: none"> ➤ Fuel savings by SIEA and reduced growth in demand for fuel imports ➤ Reduction of greenhouse gas emissions ➤ Reduction in consumer electricity bills ➤ A more energy aware public
Alignment with NDS and Energy Policy	Will contribute to NDS Objective 6: <ol style="list-style-type: none"> a) To reduce costs and protect the environment, ensure fuel conservation and efficiency in end use of petroleum products b) Reduce energy costs by promoting EE and EC, in the context of the introduction of product standards for appliances, including appliance labelling, EE ratings and promotion of energy efficient technology, and ensure minimal negative environmental impacts of energy production, distribution and consumption
Estimated cost	<ul style="list-style-type: none"> ➤ Awareness campaign at national and provincial level and mainstreaming into RE and national energy workshops: SBD 411,392.41 ➤ Integrating EE into school curriculum: SBD 158,227.85 ➤ Awareness advocacy – national events and seminars: SBD 791,139.24 ➤ Awareness advocacy – TV and radio advertisements: SBD 949,367.09 ➤ Buy one get one free CFL light bulb initiative: SBD 744,541.17 ➤ Household electricity bill rebate initiative: SBD 4,781,835.44 ➤ Household energy efficient retrofit loans: SBD 791,139.24
Implementation period	2014–2019
Potential funding	SIG, SIEA, private sector, development partners, submissions to GEF -6

Table 9: Regulations and standards investments for appliance and labelling programmes and activities

Responsible agency	ED, SIEA, all 27 Heads of ministries and staff, Ministry of Finance
Background/ Rationale	Appliances used in Solomon Islands presently are generally very inefficient in their energy usage and standards are not currently in place for appliances such as refrigerators, freezers, air conditioning units. The NDS (2011–2020) highlighted the efficient use of energy and promotion of energy conservation measures as part of its policy and strategy for energy. There is no fiscal incentive such as tax rebate or reduced import duty on imports of efficient LED lights or energy labelled refrigerators or freezers and air-conditioners. Neither is there a national standard for MEPS.
Objectives	<ul style="list-style-type: none"> ➤ To prevent highly inefficient appliances and vehicles from entering and being traded in Solomon Islands ➤ To ensure staff enforcing standards are trained to monitor appliances against the relevant standard effectively ➤ To prevent sub-standard products from entering local markets
Scope of projects	<ol style="list-style-type: none"> a) Adopt through legislation minimum energy performance standards and labelling for electrical appliances such as fridges, freezers, air conditioning units and lights. b) Review the Electricity Act to include EE standards and labelling and regulate imports of appliances through the Customs Act. c) Train customs staff in enforcement of standards for regulated and prohibited items. d) Commission a study of the costs and benefits of introducing fiscal or financial incentives for energy-efficient appliances (for appliances not covered under (a)) and vehicles. e) Develop partnerships to promote energy-efficient technologies for cooking and heating.
Benefits	<ul style="list-style-type: none"> ➤ Fewer energy inefficient appliances being used in Solomon Islands, with resulting benefits of reduced fuel use and power demand ➤ Reduction of greenhouse gas emissions ➤ Reduction in consumer electricity bills ➤ Greater business understanding of the long-term savings that can be made through investing in energy efficient appliances and technologies ➤ Reduced costs of doing business ➤ Fewer trees cut down ➤ Improved health related to cooking with efficient biomass stoves
Alignment with NDS	Will contribute to NDS Objective 6: <ol style="list-style-type: none"> a) To reduce costs and protect the environment, ensure fuel conservation and efficiency in end-use of petroleum products b) To reduce energy costs by promoting EE and EC, in the context of the introduction of product standards for appliances, including appliance labelling, EE ratings and promotion of energy-efficient technology and ensure minimal negative environmental impacts of energy production, distribution and consumption on the environment
Estimated cost	<ul style="list-style-type: none"> ➤ Appliance labelling and standards programme (includes training and legislation development): SBD 10,255.610 ➤ Study of the costs and benefits of introducing fiscal or financial incentives for energy-efficient appliances and efficient vehicles: SBD 118,670.89 ➤ Scaling up the use of biomass stoves SBD 791,139.24
Implementation period	2014–2019
Potential funding	PALS –AUSAid/ SPC, SIG, ROC & GEF-6

Table 10: Summary of investment schedule for EE and EC

Planning Stage	Implementation Stage					
	2014	2015	2016	2017	2018	2019
Energy efficiency activities	Total cost SBD					
POWER UTILITY						
Conduct supply side management activities – WB and KEMA report recommendations			Refer to SIEA Development Strategic Plan and KEMA 2012 reports			
SUB – TOTAL						
Conduct demand side management activities GOVERNMENT-LED INITIATIVES						
Strengthening capacity and resources for the Energy Office in implementing SIG energy initiatives						
Workshop of energy staff in EE and EC initiatives	43,512.66	21,756.33	21,756.33			
Training of energy staff in energy auditing	87,025.32	87,025.32				
Hiring of energy attaches	348,101.27	69,620.25	69,620.25	69,620.25		
Recruitment of an energy specialist for SI	2,768,987.34	553,797.47	553,797.47	553,797.47		
Procurement of energy auditing equipment	118,670.89	59,335.45	59,335.45			
Energy data collection activities for the central database	118,670.89	39,556.96	39,556.96			
Establishment of the SI central database portal	791,139.24	263,731.08	263,731.08			
Development of advocacy materials	474,683.54	94,936.71	94,936.71	94,936.71	94,936.71	
SUB TOTAL	4,750,791.15	1,189,741.57	1,102,716.25	1,021,624.47	718,354.43	0

Energy efficiency activities	Total cost SBD	2014	2015	2016	2017	2018	2019
Prospective Investments for government-led initiatives on EE							
Commence energy audits for all 27 ministries – 5 per year	961,234.18	240,380.55	240,380.55	240,380.55	240,380.55	240,380.55	
EC efforts – advocacy to all sectors	395,569.62	65,928.27	65,928.27	65,928.27	65,928.27	65,928.27	65,928.27
Lighting replacement programme – 4 ft lights replacement – replacing 18,614 60 watts to 11 watts CFL	3,066,811.41	613,362.28	613,362.28	613,362.28	613,362.28	613,362.28	613,362.28
EE efforts – Cooling load improvements	6,408,227.85	2,136,075.95	2,136,075.95	2,136,075.95	2,136,075.95		
EE efforts – Office appliance improvements and retrofits	4,272,151.90	1,424,050.63	1,424,050.63	1,424,050.63	1,424,050.63		
Prepare policy brief for target reduction in energy consumption of all government offices	no associated costs						
SUB TOTAL	15,103,995	4,479,726	4,479,726	4,479,726	4,479,726	919,599	65,928
COMMERCIAL AND INDUSTRIAL SECTOR INITIATIVES ON EE							
Energy survey of major commercial and industrial buildings	158,227.85	79,113.93	79,113.93				
Workshop on financial supporting mechanisms for EE improvements	37,822.78		\$37,822.78				
Energy audit of commercial and industrial buildings	1,977,848.10	395,569.62	395,569.62	395,569.62	395,569.62	395,569.62	395,569.62

Energy efficiency activities	Total cost SBD	2014	2015	2016	2017	2018	2019
Lighting replacement programme - 4 ft and 2 ft tube lights replacement	7,911,392.41	527,426.16	527,426.16	527,426.16	527,426.16	527,426.16	
EE efforts – Cooling load improvements		527,426.16	527,426.16	527,426.16	527,426.16	527,426.16	
EE efforts – Office appliance improvements and retrofits		527,426.16	527,426.16	527,426.16	527,426.16	527,426.16	
SUB-TOTAL	10,085,291	2,056,962	2,094,785	1,977,848	1,977,848	1,977,848	0
PUBLIC AWARENESS & RESIDENTIAL SECTOR							
Mainstreaming EE and EC in energy and gender activities and workshops	411,392.41	205,696.21	205,696.21				
Mainstreaming EE and EC activities into the school curriculum	158,227.85	52,742.62	52,742.62	52,742.62			
Awareness advocacy – contribution to national events and seminars	791,139.24	158,227.85	158,227.85	158,227.85	158,227.85	158,227.85	
Awareness advocacy – TV and radio advertisements Buy one, get one free. CFL light bulb initiative	949,367.09	189,873.42	189,873.42	189,873.42	189,873.42	189,873.42	
Buy get one free CFL light bulb initiative	744,541.17	186,135.29	186,135.29	186,135.29	186,135.29	186,135.29	
Household electricity bill rebate initiative	4,781,835.44	1,593,945.15	1,593,945.15	1,593,945.15			
Household energy efficient retrofit loans	791,139.24	131,856.54	131,856.54	131,856.54	131,856.54	131,856.54	131,856.54

Energy efficiency activities	Total cost SBD	2014	2015	2016	2017	2018	2019
SUB TOTAL	8,627,642.44	2,518,477.07	2,518,477.07	2,312,780.86	666,093.10	479,957.81	131,856.54
APPLIANCE AND LABELLING PROGRAMMES , EQUIPMENT AND TECHNOLOGIES							
Awareness on labelling and standards to commence	300,000	150,000	150,000				
Appliance labelling and standards programme (includes training and legislation development) targeting refrigerators, freezers, air conditioners and lighting	10,255,610.89	5,127,805.45	5,127,805.45				
Study of the costs and benefits of introducing fiscal or financial incentives for energy-efficient appliances and vehicles	118,670.89	59,335.45	59,335.45				
Efficient biomass stove cooking	791,139.24	395,569.62	395,569.62				
SUB-TOTAL	11,165,421	5,582,711	5,582,711	9,791,979	4,281,895	3,855,451	
TOTAL ESTIMATED INVESTMENTS SBD	49,733,141	15,827,617	15,778,414	9,791,979	4,281,895	3,855,451	



Annex 1: SPC energy consumption calculation sheet

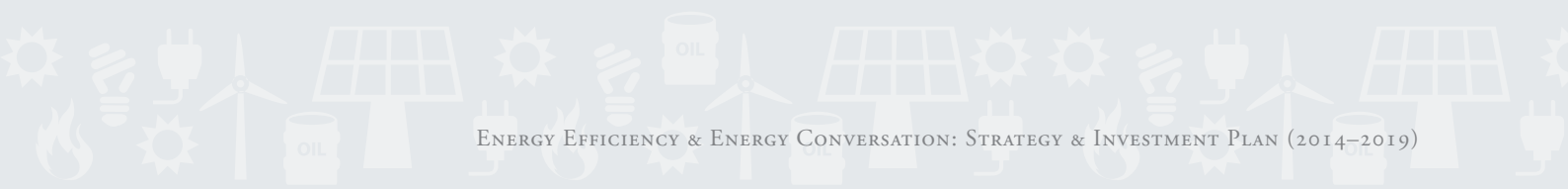
Appliances	Average (peak) power consumption in kW (Watts/1000)	Number of hours used per day (hours/hr)	Number of kilo watts used (daily) kW x hours used = kWh per day
Kitchen			
Lights			
Refrigerator			
Microwave			
Toaster			
Electric jug			
Others			
Laundry			
Lights			
Iron			
Washing machine			
Solar hot water booster			
Others			
Lounge/Dining			
Lights			
Television			
VCD/DVD player			
Stereo			
Others			
Bedroom One			
Lights			
Others			
Bedroom Two			
Lights			
Others			
Bedroom Three			
Lights			
Others			
Bathroom			
Lights			
Others			
Total	_____ Kw	_____ hrs	_____ kWh/day

Estimated monthly electricity bill = kWh/day x 30 days x tariff rate

(Other charges, such as taxes and fuel adjustments charges, could also be included in your electricity bill)

Annex 2: Electricity wattage for home appliances

Household Item.....	watts		Household Item.....	watts	
	<i>Small</i>	<i>Large</i>		<i>Small</i>	<i>Large</i>
Coffee maker	750	1800	Vacuum cleaner	200–	1200–
Dishwasher	1100	2000		200–500	2400
Toaster	800	1400	Water blaster	250	1100
Toaster oven	900	1225	Energy saver light bulbs	250	39
Compact or small microwave	600	800	Incandescent light bulb	5	150
Midsize and large oven	850	1650	Clock radio	25	
Refrigerator	225	800		10	
Refrigerator/Freeze	225	1200	Washing machines		
Freezer	180	600	Twin tub (no heating features)		600
Electric jug/kettle	1800	2400	Top loader – Agitator	350	1200
Electric stove	1600	2400	Top loader – Impeller	290	1200
Electric rice cooker	200	1400	Front Loader	290	1200
Electric frying pan	1100	2400	Clothes drier	290	1800
Blender	210	650		1000	
Food processor	400	1000	Appliance charger		
Sandwich maker	220	900	Land line phone		25
Electric work	800	2400	Mobile phone	3	4
Deep fat fryer	1600	2400	Camera	1.5	15
Grinder	120	400		3	
Juice extractor	400	1200			
Mixer	150	4000			Asleep
Urn	1800	2400			Awake
Hot water boosters	1100	2200	TV decoder		2–9
Ceiling fan	50	175	Desktop computer with LCD monitor	15–25	30–50
Stand fan	50	90		110–140	
Desk fan	30	65		150–	50–70
Window air conditioner	800	2400	Desktop computer with CRT monitor	180	
Split air conditioner	800	2400		30–65	10–20
Electric coil (e.g. vape)	5	10	Laptop		
Hair dryer	960	2000			
Hair straightener	170	750			
Hair trimmer	7	75			
Electric shaver	7	20			
Electric sewing machine	90	200			
Heater (portable)	750	1500			
Clothes iron	900	2400			
Telephone	7	12			
Fax machine	60	300			
Laser jet Printer	200	600			
Inkjet printer	20	100			
Scanners	15	45			
VCR player	17	41			
DVD player	15	60			
Stereo big sizes	290	500			
Stereo small sizes	30	100			
Radio CD/Cassette player	7.5	40			





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