

An assessment of fiscal and regulatory barriers to the deployment of energy efficiency and renewable energy technologies in Grenada

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Executive Summary

Energy represents a fundamental input for modern economies and social life. The world today faces two main threats related to energy. Firstly inadequate and insecure supplies at affordable prices and secondly global warming due primarily to the over-consumption of fossil fuels. Coupled with this, is that the prospects for global energy markets, heighten concerns around energy security and the impact of climate change on energy-dependent small island states such as those in the Caribbean. Small island developing States (SIDS) are unique because of their small size and geographical location – but SIDS also are vulnerable to the high cost of imported fossil fuels.

The energy sector in Grenada is not unlike other Caribbean countries – there exists a high dependence on fossil fuels. The electricity sector accounts for 40 per cent, with the transport sector accounting for approximately half of the primary energy use in the country. Grid access is over 99 per cent and electricity supply is reliable. The electrical utility has an installed capacity of about 50MW and peak demand of about 30MW.

The oil import bill in Grenada represents about 7 per cent of total import bill of Grenada and 76 per cent of total annual export revenues of Grenada. The high energy import bill contributes to balance of payments deficits and places pressure on foreign exchange reserves and exchange rates. Peak demand in electricity in 2010 was 30.8MW, all of which was serviced by 52 MW of diesel power.

The electricity market of Grenada is dominated by a private company, Grenada Electricity Services Limited (GRENLEC) which is a vertically integrated company. GRENLEC currently has a monopoly in generation, transmission and distribution although the Government has intentions decoupling generation from transmission and distribution.

The Government of Grenada continues to take a strategic approach to the development of the energy sector. In 2011, the Government developed its National Energy Policy which in large part provides the framework for advancing renewable energy technologies and energy conservation and efficiency strategies. It seeks to effectively address the country's energy constraints and needs, now and in the future. This policy framework therefore sets the stage for putting forward recommendations for Government consideration through this report that would allow for eliminating and/or reducing the barriers to the deployment of renewable energy technologies and energy conservation and efficiency strategies.

This study was undertaken to identify fiscal and regulatory barriers to implementing renewable energy (RE) technologies and energy conservation and efficiency (ECE) strategies and to recommend options for the removal of these barriers. This report presents the findings of the study. The preparation of the report was facilitated by a comprehensive desk review of relevant documents and by consultations with key persons in the public and private sectors and civil society. The report presents a range of policy options that could be considered by the Government of Grenada as it seeks to implement its National Energy Policy 2011. The recommendations are designed to advance both renewable energy and energy conservation and efficiency priorities and build on the strategies identified in the National Energy Policy. As such, the recommendations presented in this paper for consideration by the Government of Grenada are aligned to the country's national energy policy and as such these policy recommendations can support many of the strategies articulated in the policy.

Grenada does have indigenous energy resources. In fact, preliminary seismic data of the geology offshore of Grenada strongly suggests that the island's exclusive economic zone may contain hydrocarbons. With respect to renewables, preliminary geochemical data indicates that Grenada may possess geothermal resources of medium enthalpy. An important aspect of the development of the energy sector will be the development of renewable energy sources in Grenada. The development of renewable energy represents a strategic response to energy security, economic and environmental challenges. Growth in the demand for electricity in Grenada is projected to double by 2028 – doubling generating capacity using imported fossil fuels would have an adverse impact on the economy of Grenada. This therefore paves the way for increasing the role of renewable energy in the economy to meet future energy demands in a sustainable way. Renewables will therefore play a critical role on reducing dependence on imported fossil fuels whilst at the same time reducing the oil import bill, and increasing energy security through the deployment of renewable energy technologies.

Improvements in energy conservation and efficiency can play a significant role in addressing energy security and achieving environmental and economic objectives. Globally, in the last few years, renewable energy technologies (RETs) have experienced substantial improvements in cost, performance, and reliability, making them competitive today in a range of applications. Led by wind and photovoltaic (PV) technologies, they represent the fastest growing of all energy. The momentum for renewable energy worldwide is strong, and the prospects for these technologies virtually untapped. The fact that today the renewable energy potential of nations is far from maximized is due in large part to a number of outstanding barriers which put renewable energy at an economic, regulatory, or institutional disadvantage relative to other forms of energy.

Based on consultations in Grenada with key stakeholders as well as an assessment of the energy sector in that country, barriers to energy efficiency as well as deployment of renewable energy technologies were identified. Some of these include: lack of mature markets and favorable policy, regulatory, and legal frameworks to encourage the development of and investment in renewable energy; weaknesses in the regulation of the electricity sector; higher initial costs of the technologies; inadequate institutional capacity; and imperfect capital markets.

Additionally, to support renewable energy and energy efficiency development, the creation of a legislative framework that provides a facilitative environment is critical. For increased energy efficiency, this includes the development of new regulations and policies that, for example, mandate minimum energy performance standards or labelling requirements. For renewable energy penetration, it is critical to create the legal framework to expand existing opportunities for incorporating independent electricity producers using solar power in the first instance into the national electricity sector structure. Accomplishing this involves revision of current legislation such as the Electricity Supply Act 1994, as well as the development of new legislation and regulations related, for example, to distributed generation and power sector restructuring. Financial and fiscal incentives that address the issues related to the relatively high cost of renewable energy and energy efficient systems and are critical to promoting both energy efficiency and renewable energy. Recommended incentives include tax credits (some of which already exist) and use of soft loans.

While the development of the National Energy Policy form the foundation of the energy agenda of Grenada, the recommendations of this study can assist in accelerating progress towards achieving the country’s energy goal of making Grenada “one of the first countries in the world to go virtually 100 per cent green in its energy sector”.

I. Introduction

Energy represents a fundamental input for modern economies and social life. The world today faces two main threats related to energy. Firstly inadequate and insecure supplies at affordable prices and secondly global warming due primarily to the over-consumption of fossil fuels. Coupled with this, is that the prospects for global energy markets, heighten concerns around energy security and the impact of climate change on energy-dependent small island states such as those in the Caribbean. Small island developing States (SIDS) are unique because of their small size and geographical location. However, SIDS also are vulnerable to the high cost of imported fossil fuels.

Most Caribbean countries are almost entirely dependent on imported petroleum as their primary source of energy. Also, in almost all of the countries, transport and electricity generation account for the largest consumption of petroleum. In almost all cases, countries in the region have taken a strategic approach to long-term planning in the energy sector towards creating higher levels of efficiency on both the demand and supply side as well as diversification in the energy mix either through the use of alternatives such as liquid natural gas (LNG) or through deployment of renewable energy based on countries own indigenous supplies. The thrust by Governments towards diversification of the energy mix in almost all Caribbean countries as other SIDS is being aggressively pursued as a means of advancing energy security, international competitiveness and affordability of energy supplies to homes and communities as well as the productive sectors.

TABLE 1
CHARACTERISTICS OF ENERGY MARKETS IN SOME CARIBBEAN SIDS

Country	TPES (PJ)	Electricity Use Per Capita (KWH)	Electricity Access (%)	Fossil Fuel Dependency (%) (2009)
Antigua and Barbuda	6.9	1 264	100.0	100
Barbados	21.3	3 481	100.0	89
Dominica	2.0	1 229	90.0	92
Dominican Republic	338.8	1 358	95.9	72
Grenada	4.2	1 777	99.5	93
Saint Lucia	5.6	2 040	98.0	98
Saint Vincent and the Grenadines	2.7	634	91.0	94
Saint Kitts and Nevis	4.2	2 095	95.0	88

Source: International Renewable Energy Agency, 2012

A. Profile of the energy sector in Grenada – issues and challenges

Grenada is a tri-island Caribbean nation encompassing the islands of Grenada, Carriacou and Petite Martinique. Although this tri-island state is small in terms of landmass (133 square miles), it contains abundant sources of renewable energy such as solar, wind and geothermal.

The energy sector in Grenada is not unlike other Caribbean countries – there exists a high dependence on fossil fuels. The electricity sector accounts for 40 per cent, with the transport sector accounting for approximately half of the primary energy use in the country. Grid access is over 99 per cent. The electrical utility has an installed capacity of about 50 MW and peak demand of about 30 MW.

Key electricity market indicators are presented in the table below:

TABLE 2
KEY ENERGY INDICATORS 2008 - 2011 – GRENADA

Key Market Indicators	2008	2009	2010	2011
Peak Demand	28.9	29.5	30.83	30.29
Net Generation (MW)	189.82	195.39	201.40	196.82
Sales including Street Lighting (GWh)	172.50	177.33	184.78	180.88
Number of customers at year end	41 222	42 928	42 699	44 249
Average Consumption Domestic (kWh)	1 897	1 833	1 901	1 835
Average Consumption Commercial (kWh)	18 124	17 576	17 795	17 155
Average Consumption Industrial (kWh)	156 352	157 434	169 345	163 906

Source: International Renewable Energy Agency, 2012

The total primary energy supply (TPES) of the country consists of the following fossil fuel products:

- Diesel
- Kerosene
- Liquid petroleum gas (LPG)
- Gasoline

The TPES in 2009 was 4.2 peta-joules of energy and oil imports accounted for 93 per cent of TPES of Grenada in 2009. The other 7 per cent includes solid biofuels, mainly charcoal for cooking and solar.

In terms of energy consumption, three sectors use primary energy – transport, electricity and domestic. Transport and electricity generation together consume about 90 per cent of the energy supplied by fossil fuels. At the end use level, about 12 per cent of total commercial energy supply in Grenada is estimated to be consumed by households for electricity and cooking. About 7 per cent is consumed by businesses, industry and the public sector in the form of electricity and about 25 per cent is lost mostly as heat through generation.

Electricity consumption is dominated by the commercial sector which accounts for about 57 per cent of all electricity sold, followed by the domestic sector, which consumes about 38 per cent, industrial usage about 3 per cent and street lighting about 2 per cent.

The oil import bill in Grenada represents about 7 per cent of total import bill of Grenada and 76 per cent of total annual export revenues of Grenada. The high energy import bill contributes to the balance of payments deficits in Grenada and places pressure on foreign exchange reserves and exchange rates.

Electricity supply is reliable and 99.5 per cent of the population has electricity access.

Installed capacity is 52.4 MW and this consists of 45.9 MW at the main generating plant in Saint George's and 2.8 MW at Saint George's University. The other 3.7 MW is installed at Carriacou and Petite Martinique. This installed capacity has remained constant since 2007 and between 2007 and 2011 this capacity has been met with an increasing demand in electricity, from 27.1 to 30.2 MW. Generation increased from 165 to 180 GWh to 201 GWh in 2010. In addition to this diesel power, approximately 0.1 MWp of photovoltaic generation capacity is installed islandwide, representing about 0.3 per cent of peak demand.

Peak demand in electricity in 2010 was 30.8 MW, all of which was serviced by 52MW of diesel power. Growth in the demand for electricity is projected to double by 2028 – doubling generating capacity using imported fossil fuels would have an adverse impact on the economy of Grenada. However this paves the way for increasing the role of renewable energy in the economy to meet future energy demands in a sustainable way. Renewables will therefore play a critical role in reducing dependence on imported fossil fuels whilst at the same time reducing the oil import bill and increasing energy security through the deployment of renewable energy technologies.

The price of electricity (tariff structure) in Grenada is about US\$ 0.40/kWh which is high, although this price still is at the lower end of the scale compared to other Windward Islands. The tariff structure in Grenada consists of a fuel charge, a non-fuel charge, value-added tax (VAT) and an environmental levy paid only by the residential sector. The price of electricity reduces the competitiveness of the Grenadian economy. Generally, the volatility of the price for fuel in the international market has a significant effect on the local market. The Global Competitiveness Report identifies the quality of electricity supply and the price of electricity as important contributors to economic growth. Within this context it may be important to reduce production costs and the average price of electricity to consumers. Lowering energy costs will be of fundamental importance to the economic development of the country and the long-term competitiveness of its productive enterprises. The retail price of electricity in Grenada is a combination of fixed and variable charges per unit, with some additional capacity charges and taxes added.

B. Policy and regulatory framework

The electricity market in Grenada is dominated by a private company, Grenada Electricity Services Limited (GRENLEC) which is a vertically integrated company. GRENLEC currently has a monopoly in generation, transmission and distribution although the Government has intentions of restricting the power sector to decouple generation from transmission and distribution.

WRB Enterprises, (through its subsidiaries Grenada Private Power and Eastern Caribbean Holdings) owns 61.4 per cent shares in GRENLEC. Currently, WRB is in the process of selling its shares. This sale presents the Government of Grenada with a unique opportunity in that it would be able to develop a new framework for the operation of the electricity sector. GRENLEC therefore is the sole provider of electricity and operates diesel power plants.

The National Energy Policy 2011 of Grenada in large part provides the framework for advancing renewable energy technologies and energy conservation and efficiency strategies. It seeks to effectively address the country's energy constraints and needs – now and in the future. This policy framework therefore sets the stage for putting forward recommendations for Government consideration through this report that would allow for eliminating and/or reducing the barriers to the deployment of renewable energy technologies and energy conservation and efficiency strategies.

As a means of initiating the transition to a low carbon economy, to promote economic development and improve international competitiveness, the Government of Grenada approved its National Energy Policy in 2011 as well as the GREENADA vision 2030 in 2012. The GREENADA Vision is a plan to make Grenada “one of the first countries in the world to go virtually 100 per cent green in its energy sector”.

The energy sector requires an appropriate regulatory framework to meet the range of challenges identified above. The Electricity Supply Act (ESA) of 1994 provides GRENLEC with a licence to operate until 2073, creating and maintaining a monopolistic electricity market. The Act also gives GRENLEC the ability to harness hydro and solar power in any part of Grenada free of charge. This sets a tone for creating a monopolistic market for renewables as well and could reduce prospects for advancing renewable energy development, posing as a significant barrier. In 2012, with the intention of WRB to sell its shares in GRENLEC, a window of opportunity was opened to the Government in that it could devise a new framework to support the deployment of renewable energy.

The amendments to ESA will enable the energy sector of Grenada to have the flexibility and capacity to adopt and adapt to emerging technologies that support its policy goals. The increase in oil prices has stimulated technological advances in developing alternative energy sources, improving efficiency in energy production and consumption, and in other areas. Emerging technologies which could become relevant to the development of the energy sector in Grenada over the planning timeframe to 2020 include fuel cells, and efficient solid state thermoelectric converters for solar energy. Unforeseen advances also could come from so-called "disruptive" technologies, which have the potential for significantly altering energy production, distribution and use in a positive manner.

Of importance as well is that Grenada does not have an independent electricity regulator. Currently, the electricity market is self-regulated by GRENLEC under the ESA. Grenada will by the end of 2013 participate in the Eastern Caribbean Electricity Regulation Project (ECERA) and by so doing enable the independent regulation for the uptake of renewable energy technologies, especially the appropriate, economically viable pricing tariff for the stakeholders involved. The participation in ECERA also calls for the revision of ESA and will assist in removing the current barriers to renewables as a result of the current ESA.

C. Renewable energy and indigenous energy sources

Grenada does have energy resources. In fact, preliminary seismic data of the geology offshore of Grenada strongly suggests that the island’s exclusive economic zone may contain hydrocarbons. With respect to renewables, preliminary geochemical data indicates that Grenada may possess geothermal resources of medium enthalpy in the Mount Saint Catherine area.

An important aspect of the development of the energy sector will be the development of renewable energy sources in Grenada. The development of renewable energy represents a strategic response to energy security, economic and environmental challenges. The use of renewable energy has a number of benefits, including reduction in dependence on imported petroleum and the associated foreign exchange import costs, reduction in greenhouse gas emissions associated with burning of fossil fuels, and long-term sustainability of supply. The main renewable energy resources for Grenada include geothermal, wind, solar, and waste-to-energy. The Government has established a target for renewable energy to supply 20 per cent of the country’s energy by the year 2020. This is presented in its national energy policy as “20 per cent of all domestic energy usage (electricity and transport) will originate from renewable energy sources by 2020”.

Currently, GRENLEC has submitted a proposed development strategy for geothermal to the Government of Grenada for the installation of a 20MW geothermal plant to be operational by 2015. Grenada had the highest penetration rate of grid-connected solar photovoltaic systems in the Eastern Caribbean. This has been due to the work of Grensol, a local company (privately owned supplier and

installer of solar PV systems) established in 2005 to provide photovoltaic systems to private individuals; coupled with a dynamic voluntary customer interconnection policy implemented by GRENLEC that encouraged the demand for customer-owned generation. Up to 2012, there existed a negotiated grid connection agreement for 1:1 net metering provide by GRENLEC, that stipulated that no individual installation could exceed 1 per cent of GRENLEC peak demand. This agreement was an interconnection policy developed by GRENLEC and allowed customers in the commercial and domestic sectors to install grid-tied renewable energy systems to a maximum installed capacity of 300 kWh and this was achieved through a fixed net metering system. Since then, GRENLEC has changed its net metering policy to net billing type policy (or a buy-all/sell-all policy) resulting in only two customers now agreeing to supply power to the grid under this net billing system. This net billing system was introduced because of the current nature of the tariff mechanism whereby customers with self-generation do not pay their fair share of the fixed cost of operating the system.

Other than photovoltaics, solar water heating is used in private residences, hotels and other commercial entities but the widespread penetration and use is nowhere close to its neighbour Barbados. Additionally, GRENLEC is actively pursuing large scale solar PV and hopes to break ground on the installation of 2 – 4 MW of capacity in 2014.

There also is potential for wind power especially on the eastern corridor of the island and over the last five years, GRENLEC has been recording wind data on at least three different sites.

It should be noted that various studies in renewable energy potential have been undertaken.

D. Energy conservation and efficiency

The focus of energy conservation and efficiency must be both on the demand and supply side. Energy efficiency and conservation represents the best immediate hope to reduce the nation's use of oil and the attendant negative environmental impacts. Many schools of thought have advocated for energy conservation to be considered to have two main components - energy efficiency and renewable energy. The National Energy Policy calls for the need to increase the efficiency of the energy sector in the generation, transmission and distribution of electricity, in the use of energy in the transport sector, and in the consumption of electricity by industrial, commercial and residential consumers. This calls for renewed national efforts to conserve energy and use it as efficiently as possible. On a micro-level, energy consumption cost is a significant component of firms' operations and can influence profitability. Investment in proven energy conservation measures can reap financial and environmental benefits, and contribute to enhanced economic competitiveness of firms.

Generation and fuel efficiency in Grenada is above 40 per cent. The generation technology is less than ten years old and is comprised of internal combustion engines running on diesel. Although these types of generators generally are reliable and easy to maintain, their typical generation efficiency is between 30 per cent to 40 per cent. The level of efficiency can be improved by updating the equipment to new, more efficient systems or by adding heat recovery steam generators to drive steam turbines. GRENLEC supply-side energy efficiency has been mixed over the last few years and of note is that the company has been able to significantly reduce distribution losses from over 13 per cent of net generation in 2000 to about 9 per cent in 2008.

Improvements in efficiency directly reduce the demand for power, which reduces use of fossil fuels and facilitates progress toward low-carbon communities. Improvements in energy efficiency can lead to economic activity and growth without requiring new energy generation capacity to be added. Utilities always have the opportunity to decrease fossil fuel use, and hence minimize carbon emissions, by making efficient use of existing capacity. Supply requires efficient use of fuels in generation, minimization of transmission losses, and reliable measurement at the point of use.

There also is inefficient energy technologies in manufacturing and other productive sectors; inefficient energy use in the public sector; low public awareness of the importance of energy conservation;

and a need for a more inadequate policy framework to promote energy conservation and efficiency – one that is buttressed by incentives and disincentives to promote conservation and efficiency.

Notwithstanding, the above, since the mid-2000s residential and commercial customers have been making investments in energy efficient lightening, primarily in compact fluorescent bulbs and more recently (since 2012) in LEDs. For example, in about 2007, Cuba donated compact fluorescent lights to the Government of Grenada and there was an islandwide programme of changing bulbs at the residential level. The Ministry of Energy continues to provide tips in energy conservation to consumers and the commercial sector on an ongoing basis. Heightened activities in this area usually occur annually during the Caribbean Community (CARICOM) Energy Week.

E. The transport sector

The transport sector had approximately 27,000 registered vehicles in 2009 and the sector has an annual average increase of 1,200 vehicles. Forty per cent of these registered vehicles are cars and about 27 per cent sport utility vehicles. Currently no ethanol blends are used and there are no hybrids, natural gas or electric powered vehicles. The average price of diesel in 2012 was US\$ 1.20 per litre and US\$ 1.24 per litre of gasoline. To date there has been no significant studies undertaken on the use of energy in the transport sector or the use of alternative fuels in the sector. Notwithstanding, the National Energy Policy 2011, does state the intention of the state to facilitate the introduction of electric vehicles into the market as well as the use of biofuels.

II. Approach and methodology

The preparation of this report was facilitated by a comprehensive desk review of relevant documents and consultations with key officials in the public and private sectors as well as with civil society organizations towards gathering information on:

- The profile of the energy sector in Grenada with a particular focus on factors of relevance to renewable energy and energy efficiency
- Barriers that exist in Grenada to deploying renewable energy and advancing energy conservation and efficiency strategies
- Suggested policy options that could effectively address the identified barriers

Stakeholder consultations were held to inform the preparation of a draft report and stakeholders also were provided with the draft report to review and comment and to verify the information and confirm that the recommendations were appropriate for the Government of Grenada.

This report presents a range of policy options that could be considered by the Government of Grenada as it seeks to implement its National Energy Policy 2011 and advance both energy conservation and renewable energy priorities.

III. Results - Barriers to the deployment of renewable energy technologies and energy conservation and efficiency strategies in Grenada

Improvements in ECE can play a significant role in addressing energy security and achieving environmental and economic objectives. Many studies over the years have identified major barriers to the implementation of ECE initiatives on a sustained basis in developing countries. These barriers include:

- Lack of information about energy conservation and a general lack of information on energy conserving or energy efficient products and services
- Limited certification schemes both for energy efficiency equipment and renewable energy technologies
- Lack of trained personnel or technical or managerial expertise to effectively develop and implement energy conservation and efficiency strategies
- Below long-run marginal cost pricing and other price distortions
- Regulatory biases or absence of regulations to support energy development
- High transaction costs
- High initial costs of energy efficiency technologies coupled with lack of access to credit
- High user discount rates
- Higher perceived risks of the more-efficient technology
- Limited information on energy efficiency in the transport sector

The areas of focus for advancing ECE in a country include: public sector, private sector (households, industrial, commercial, and tourism), electricity, transport, codes and standards, energy conservation and efficiency market, renewable energy technologies, environment, institutional framework and technical capacity development.

With respect to renewable energy technologies (RETs), in the last few years, these technologies have experienced substantial improvements in cost, performance, and reliability, making them competitive today in a range of applications. Led by wind and photovoltaic technologies, they represent the fastest growing of all energy industries (though starting from a relatively low base). The momentum for renewable energy worldwide is strong, and the prospects for these technologies virtually untapped.

The fact that today the renewable energy potential of nations is far from maximized is due in large part to a number of outstanding barriers which put renewable energy at an economic, regulatory, or institutional disadvantage relative to other forms of energy. Based on consultations in Grenada with key stakeholders as well as an assessment of the energy sector in that country, the following barriers were identified:

1. Lack of mature markets and favorable policy, regulatory, and legal frameworks to encourage the development and investment in renewable energy. This for example calls for a revision of the current regulatory framework as well as the introduction of modern legislation such as portfolio standards to facilitate the increase use of renewables. Another clear example is the need for a clear interconnection policy for deploying distributed photovoltaic. The existing monopoly governing GRENLEC can also be seen as a barrier to renewable energy deployment, even though GRENLEC has a strong interest in investing in renewable energy and using renewables such as geothermal to generate electricity.
2. There also exist weaknesses in the regulation of the electricity sector in that Grenada currently does not have an independent electricity regulator and the power sector is self-regulated by GRENLEC.
3. The higher relative costs of the technologies (despite cost reductions) in a number of applications; renewable energy systems have higher upfront capital costs than conventional alternatives, though lower operation and maintenance costs.
4. Inadequate institutional capacity for some aspects of renewable energy project/programme design, development, and implementation, including limited skills and knowledge around renewable energy technologies generally.
5. Imperfect capital markets; insufficient access to affordable financing for project developers, entrepreneurs, and consumers; and financing risks and uncertainties.
6. Low levels of awareness and understanding of the benefits, costs, and applications of renewable energy among policymakers, the local private sector, finance institutions, and prospective customers. Whilst there is some information available to consumers, this can be enhanced and expanded to include available technology options as well as available technical expertise for installation and maintenance in-country.
7. Inadequate information on the renewable energy resource potential including a need for additional studies on renewable resources such as mapping exercises.

Notwithstanding these barriers, there are a number of drivers spurring market growth in renewable energy. Most notably, investments in technology research, development, and demonstration, primarily by industrialized nations; supportive policy and regulatory frameworks; energy security issues; environmental and climate change concerns; and local and regional development opportunities that these technologies offer. Price spikes and supply concerns over fossil based technologies are further increasing interest in and demand for the technologies.

A. The role of the National Energy Policy of Grenada in removing fiscal and regulatory barriers to advancing energy conservation and efficiency and renewable energy deployment

The National Energy Policy 2011 of Grenada provides a sound framework for identifying policies to address many of the barriers that the country faces with respect to advancing both energy conservation and renewable energy development. The policy prescriptions presented in this paper for consideration by the Government of Grenada in the section immediately following this table will support the development and achievement of the following strategies as articulated in the National policy. These strategies that will be supported (aligned to the policy goals are):

TABLE 3
A SYNOPSIS OF THE NATIONAL ENERGY POLICY AND THE STRATEGIES THAT WILL BE SUPPORTED BY THE POLICY RECOMMENDATIONS CONTAINED IN THIS PAPER

National Energy Policy Goals 2011	Strategies in National Energy Policy that will be supported by Policy Recommendations in this paper to reduce or eliminate barriers to renewable energy development and energy conservation
Establish an appropriate and enabling legal architecture on which the policy can rest....	<ul style="list-style-type: none"> • Establish a regulatory body for licensing, oversight, regulation and rate setting for the electricity and transport sector
Twenty per cent of all domestic energy usage (electricity and transport) will originate from renewable energy sources by 2020	<ul style="list-style-type: none"> • Promote and facilitate the introduction of renewable energy technologies in the country's energy matrix • Compile renewable energy resource potential assessments and make information publicly available • Provide fiscal incentives (e.g. tax rebates, subsidies, feed-in tariffs, et al) based on objective cost-benefit analysis to all sectors of the economy and society (considering equitable access to such) to encourage increased use of renewable energy and energy efficiency technology and systems; Provide networks, channels, and incentives for the development of local expertise to install, operate, manage and maintain aforementioned systems • Promote the development of small-scale, grid-integrated renewable generation capacity and formulate procedures and standards for system interconnection, reciprocal tariffs and streamlined project approval processes • Design and implement an ongoing national programme (for all age levels) of education and awareness on energy – environment – society • Continuously review, with a view to implementing, market innovations in the area of RETs such as may be appropriate for the circumstances and conditions in Grenada • Provide fiscal and other incentives to promote the use of solar water heating in new and existing homes and the use of small grid-integrated renewable systems • Ensure the integration of small renewables systems to the national grid, and including provisions for reciprocal tariffs with the utility
Reduce the national rate of energy consumption while increasing the economic growth, by adopting best practices in energy efficiency and conservation	<ul style="list-style-type: none"> • Ensure the gradual displacement of hydrocarbon imports and usage by reducing the national energy demand • Inform consumers upon behavioural changes that can lead to energy conservation in the end-use sectors • Design appropriate energy-efficiency and conservation programmes; Provide comprehensive fiscal incentives to encourage the import and use of energy efficient appliances, vehicles, technology in power generation and manufacturing, and other sectors; Encourage and facilitate energy-conservation behaviour by all consumers • Encourage and facilitate the use of energy audits in businesses and households; Encourage appliance suppliers to import energy efficient

Table 3 (concluded)

National Energy Policy Goals 2011	Strategies in National Energy Policy that will be supported by Policy Recommendations in this paper to reduce or eliminate barriers to renewable energy development and energy conservation
Transition to an efficient, low-carbon, national electricity generation and interconnection network that ensures safe, efficient, affordable and environmentally friendly energy services	<p data-bbox="691 281 1019 306">appliances and to properly label them</p> <ul style="list-style-type: none"> <li data-bbox="646 317 1349 422">• Adopt appropriate standards for energy efficient building codes that will inform the design, construction and outfitting of buildings in Grenada; Make such standards to be mandatory for all new public sector/statutory construction <li data-bbox="646 432 1349 537">• Provide incentives for preferential rates for financing, by the commercial banking sector, of new (and retrofitted) green homes and buildings; Provide the public and private sector incentives and institutional capacity to monitor and analyze cross-sectoral energy efficiency and conservation <li data-bbox="646 548 899 573">• issues and performance <li data-bbox="646 583 1333 632">• Consider tax incentives for industry to use energy-efficient equipment and processes such as heat recovery <li data-bbox="646 642 1284 667">• Establish efficiency standard for commercial and industrial activities; <li data-bbox="646 678 1300 747">• Provide tax relief/rebates to companies meeting the energy efficiency standards set by government (e.g. complying to “cradle to cradle” manufacturing processes) <li data-bbox="646 758 1365 827">• Create a regulatory framework and necessary incentives that will foster/increase/ improve high efficiency of electricity generation, transmission and distribution <li data-bbox="646 840 1349 945">• Provide incentives for the introduction by electricity generators of renewable energy technologies and fuel sources that reduce dependency, increase energy conversion efficiency and lower greenhouse gas emissions (environmentally-sound) <li data-bbox="646 955 1333 1024">• Provide a regulatory framework that allows for the fair (avoid oligopolies), efficient and economically viable involvement of private investment in the power sector <li data-bbox="646 1035 1349 1083">• Provide the appropriate standards, guidelines and regulatory system for the integration of renewable energy to the national electricity system
Establish an affordable and reliable public transport sector and increased use of more efficient public and private vehicles and transport alternatives to reduce energy consumption	<ul style="list-style-type: none"> <li data-bbox="646 1094 1349 1163">• Create the appropriate tax regime to encourage importation of fuel efficient vehicles, the development of the supporting infrastructure and ethanol and other “green fuels” (e.g. biodiesel, including algal oil); <li data-bbox="646 1176 1300 1230">• Ensure the development and introduction of vehicle emission and fuel efficiency standards

Source: Author’s compilation

IV. Main policy considerations to reduce and/or remove the barriers to renewable energy and to promote energy conservation and efficiency in Grenada

The recommendations presented in this section for consideration by the Government of Grenada are aligned to the country's national energy policy and as such these policy recommendations can support many of the strategies articulated in the policy. The policy recommendations also presented here were discussed with key stakeholders at a meeting held in Grenada in November 2013.

A. Proposals for advancing energy conservation and efficiency

For energy efficiency experts, improving energy efficiency reflects the results of actions that aim at reducing the amount of energy used for a given level of services (e.g. lighting, cooling, and transportation): purchase of efficient equipment, retrofitting investments to reduce the consumption of existing buildings and facilities, or avoiding unnecessary consumption of energy. Avoiding unnecessary consumption is certainly a matter of individual behaviour, but it is also, often, a matter of appropriate equipment: control of room temperature or automatic deactivation of lights in unoccupied hotel rooms are good examples of the way in which equipment can reduce the influence of individual behaviour.

The energy efficiency policy options presented here for consideration by the Government of Grenada include a range of public interventions ("policy measures") aimed at improving the energy efficiency of the country, through adequate pricing, institutional setting, regulation and economic or fiscal incentives and more importantly attempts to illustrate ways in which the identified barriers to the successful deployment of energy conservation and efficiency strategies could be attained.

TABLE 4
BARRIERS TO IMPLEMENTING ENERGY CONSERVATION AND EFFICIENCY
STRATEGIES IN GRENADA AND SOME POLICY MEASURES TO REMOVE BARRIERS

Barrier to Implementing Energy Conservation and Efficiency Strategies in Grenada	Policy Measures to Remove Barriers
Lack of information	Information centres and services; appliance labelling and consumer information
Lack of trained personnel or technical or managerial expertise	Development and delivery of training programmes
Below long-run marginal cost pricing and other price distortions	Instituting supportive legal, regulatory and policy changes
Regulatory biases or absence of regulations to support energy development	Development of relevant policies and standards
High transaction costs	Market development and commercialization; development of demand-side management programmes, support for the introduction of energy service companies
High initial costs of energy efficiency technologies coupled with lack of access to credit	Develop innovative financing mechanisms
High user discount rates and start-up and loan costs to engage introduce ECE technologies	Support for the introduction of energy service companies
Higher perceived risks of the more-efficient technology	Technology research, adaptation, and demonstration; and/or performance contracting

Source: Author's compilation

Specific policy considerations to be elaborated in this section include:

- Regulations and compliance measures such as mandatory labelling for new appliances, new cars and buildings, mandatory energy efficiency standards for new appliances and lamps for lighting, new cars and new buildings, car labels for fuel consumption, revision of the national building code, regulations, relating to obligation of maintenance, Energy consumption reporting and mandatory installation of solar water heaters
- Financial and fiscal incentives such as soft loans and reducing the tax to be paid when purchasing energy efficient equipment
- Development and implementation of public sector wide energy conservation and efficiency programmes
- Review and amendment of curricula at the vocational training institutes
- Establishment of energy service companies
- Review of government procurement policy to stimulate demand for energy conservation and efficiency as well as renewable energy.

1. Regulations and compliance

Regulations for energy efficiency are widely used globally as they have been proven effective in lowering energy consumption of specific appliances and equipment and in speeding up the diffusion of energy efficient equipment, energy savings investments and practices. Regulations represent a powerful instrument to promote energy efficiency but their impact depends on good implementation and effective compliance. For Grenada, regulations that should be considered for energy conservation and efficiency are:

- Mandatory labelling for new appliances, new cars and buildings as well as devising minimum energy efficiency/performance standards (MEPS) for new appliances and lamps for lighting, new cars and new buildings

- Revision of the National Building Code
- Regulations, relating to obligation of maintenance
- Energy consumption reporting
- Mandatory installation of solar water heaters for large developments and Government projects
- Government procurement policy and practices
- Development and implementation of public sector wide energy conservation and efficiency programmes

Mandatory labelling for new appliances, new cars and buildings as well as devising minimum energy efficiency standards for new appliances and lamps for lighting, new cars and new buildings

These regulations could take the form of efficiency standards. As is common in developing and emerging countries, labelling is often among the first measures to be introduced, generally for refrigerators. Labelling will encourage Grenadian consumers to purchase more efficient appliances and suppliers to remove inefficient appliances from the market. It would be important for any labelling programme to be designed with a specific aim of providing consumers with information, which would enable them to compare the energy efficiency of different appliances available for purchase. Grenada should opt to first focus on labelling standards for refrigerators, along with air conditioners, lamp and lamp ballasts since this accounts for a large part of household electricity consumption. These can then be followed by labelling standards for washing machines, dryers, water heaters, computers, tyres and window glazes.

With respect to cars and other vehicles, consideration should be given to introducing car labels for fuel consumption (l/100km and /or km/l) and CO₂ emissions (g/km). This is a simple measure as most car manufacturers on the global market have such information already available. This measure should be promoted along with adequate information campaigns. This could also be tied to other fiscal and financial incentives. Currently in Grenada there is no discrimination in terms of taxes for large and small vehicles - small cars and larger vehicles pay the same duty and fuel efficiency is not taken into account.

Review and revision of the National Building Code

With respect to new buildings, Grenada should make attempts to revise its National Building Code to take into account standards for building design which takes into account energy efficiency of buildings both at the domestic, government and commercial levels. This would involve ensuring that the building code is performance based, whereby the code would focus on the whole building as a system and integrate equipment such as air conditioning systems, ventilation and water heaters into building design. The building code could be implemented jointly with the standards and labelling programme to ensure that there is the dissemination of the most efficient equipment in the design and construction of new buildings and retrofitting of existing buildings. It should be noted that new buildings represent only a small share of the existing building stock, and therefore the revision of the buildings standards should take into account retrofitting of existing buildings. Building codes tend to have a slow impact on the short term, but is significant in the long-term.

Regulations, relating to obligation of maintenance

Regulations, relating to obligation of maintenance (e.g. for boilers, air conditioners, cars), for designated consumers (mainly in industry such as the tourism and hotel industry) stipulate or encourage reporting on energy consumption and conducting energy audits. Energy audits either through voluntary compliance or a mandatory programme should be considered by the Government of Grenada. For example, energy audits, either in the form of walk-through audits or detailed energy

audits for government buildings and other commercial buildings and hotels will enable a better understanding of the current status of energy use and identify potential actions for energy savings. Energy audits and the implementation of various conservation and efficiency measures can lead to savings of 5 to 50 per cent for the participating entities.

These regulations if implemented therefore will impose minimum efficiency standards by law and/or promote energy efficient practices, as well as to provide systematic information to consumers (e.g. energy audits and energy labelling).

Energy consumption reporting

Energy consumption reporting is another measure that would be useful to the Government of Grenada. This can be done either through voluntary compliance or a mandatory scheme requiring designated or large consumers to report their energy consumption, either directly to the Government or in their annual report. It would be important to stipulate that government entities also report their measured consumption. This measure should be developed as an incentive to companies and government entities to monitor closely their energy performance.

Government procurement policy and practices

Government procurement policy could be used as an effective mechanism to stimulate demand for energy conservation, efficiency as well as renewable energy. This policy can promote sustained and orderly commercial development of renewable energy. Governmental purchase agreements can reduce uncertainty and spur market development through long-term contracts, pre-approved purchasing agreements, and volume purchases. Government purchases of energy efficiency technologies as well as renewable energy technologies in early market stages can help overcome institutional barriers to commercialization, encourage the development of appropriate infrastructure, and provide a “market path” for technologies that require integrated technical, infrastructure, and regulatory changes.

Mandatory installation of solar water heaters for large developments and government projects

It should be noted that even in fairly mature markets, solar water heating systems are not always used even when they are cost effective. The reasons for this include, lack of trust in new technologies, long payback times and reference for immediate savings, insufficient information, lack of motivation and awareness and high transaction costs. In these circumstances, regulations making the use of solar heaters mandatory provide a way of expanding diffusion. In the case of Grenada and other small islands in the region, the use of a mandatory mechanism may not be effective and therefore consideration in this case should be for large developments (e.g. hotels, new housing developments and commercial complexes) and well as government projects (housing developments, new buildings and hospitals) that have the potential to use solar water heating in their operations.

Development and implementation of public sector wide energy conservation and efficiency programmes

Development and implementation of public sector wide energy conservation and efficiency programmes and/or environmental stewardship programme for public sector facilities and operations have significant opportunities for energy efficiency improvements. The public sector’s energy demand when combined across all ministries in Grenada like most other countries is large in size, and public sector actors are also major buyers of energy-using equipment such as office appliances and vehicles. In considering the public sector, it should be noted that a major part of public sector energy use results from energy used by public buildings (offices, healthcare and educational facilities) for lighting, cooling and ventilation as well as equipment in these buildings (e.g. office equipment, white goods such as boilers in hospitals and refrigerators). Transportation related energy use combines vehicle fleets used in public services (e.g. post or waste collection) and public transportation.

Additional energy use in the public sector is related to utility provision (e.g. water and wastewater treatment) and public lighting (including street lighting and traffic lights). Public authorities also manage various other facilities such as prisons that use energy.

Benefits of improved energy efficiency in the public sector are many and include lower energy bills and reduced demand for investments in energy supply systems. Further benefits result from the public sector's exemplary role ("leading by example") relative to other sectors.

2. Financial and fiscal incentives

Financial and fiscal incentives provide a very useful mechanism for the diffusion of energy conservation and efficiency strategies and energy efficiency equipment. Economic instruments include financial incentives to promote energy efficiency (e.g. subsidies for energy audits or investment, soft loans), as well as fiscal measures. Economic incentives are aimed at encouraging investment in energy efficient equipment and processes by reducing the investment cost, either directly (economic incentives) or indirectly (fiscal incentives). To be effective, financial and fiscal incentives will need to be combined with public information and awareness campaigns (many of these already exist in Grenada and the CARICOM Energy Week in November each year also provides a good opportunity for advancing awareness raising) to stimulate public interest in energy efficient equipment and energy conservation in general. The economic incentives that Grenada should consider are presented below.

Soft Loans

The use of soft loans is a good measure to ensure easy access to credit with appropriate conditions for financing initial investments and is a fundamental measure to overcome the initial cost barriers. Soft loans, are loans at subsidised interest rates (i.e. lower than the market rate) to consumers who invest in energy efficient technologies and equipment. Soft loans have the advantage of being easily implemented by banking institutions. In developing soft loans, Grenada should consider working with donors to establish credit guarantee schemes to encourage banks to be more active in financing such operations by taking more risk. There are many examples of countries (e.g. India) that has done this.

Tax credits

A fiscal incentive that should be considered by the Government of Grenada is to reduce the tax to be paid by consumers when purchasing energy efficient equipment through the removal of VAT, and some import duties on LEDs, compact fluorescent lights, solar water heaters and energy efficient cars or when investing to improve energy efficiency in buildings (reduction in VAT rate on energy efficient air conditioners and LEDs). Tax credits are recommended here as they are considered better than subsidies, as they are less costly for the budget of the Government. Note that a disadvantage of tax credits is that they do not lower the barrier of the initial upfront payment, and therefore do not help low-income households, quite unlike subsidies. Currently in Grenada, purchasers of solar equipment can get fiscal incentives on a case-by-case basis (for example, hotels can apply to the Grenada Industrial Development Cooperation for these incentives) or individuals can apply to the Ministry of Finance and Energy for these incentives. Consideration should now be made to open up these incentives to all and to apply them to a wider range of energy efficient equipment. Currently the cost of a solar water heater is about US\$ 2,000 and once a purchaser applies for the incentive, VAT is eliminated as well as other subsidies – so only 5 per cent duties for solar is charged and this represents only the customs service charge – otherwise the duty would be between 5 to 35 per cent.

Another area for consideration would be the use of a luxury tax on energy inefficient vehicles – that is, a consumption tax for luxury imports or "non-essential" goods that could range between 15 and 60 percent as is done in many developed countries. The tax is calculated on the CIF price.

3. Education and training

Review and amendment of curricula at vocational training institutes

The advancement of both energy efficiency technologies as well as renewable energy technologies will require a cadre of trained personnel to be available for installation of RETs as well as equipment maintenance. To this end, it would be necessary to infuse energy efficiency issues as well as renewable energy into the the current curricula or to develop new programmes focussed on energy conservation and renewable energy. Applicable institutes for this would include the two technical and vocational institutes on the island. One example would be to include energy conservation issues related to the installation and servicing of solar power equipment (photovoltaics and water heaters) into the electrical installation course at the Grenada National Training Agency as well as courses at TAMCC.

It should be noted The National Ozone Unit (NOU) of Grenada in conjunction with the United Nations Environment Program Regional Office for Latin America and the Caribbean (UNEP ROLAC) facilitates some training in energy conservation and efficiency as well as renewable energy.

4. Energy solutions

Energy service companies (ESCOs)

Consideration for the establishment of ESCOs to advance energy conservation and the deployment of energy efficient technologies must also be considered. An energy service company is a commercial business that provides a broad range of comprehensive energy solutions including designs and implementation of energy savings projects, retrofitting, energy conservation, energy infrastructure outsourcing, power generation and energy supply, and risk management. In effect ESCOs can be viewed as innovative financing methods for energy conservation and efficiency. ESCO starts by performing an in-depth audit of the property, and then installs the required pieces of equipment and maintains the system to ensure energy savings during the payback period. The savings in energy costs derived from the changes or new installations are often used to pay back the capital investment of the project over a five- to twenty-year period. The establishment of ESCOs in a country usually is governed by regulations to protect the interest of both ESCO and the consumer.

What sets ESCOs apart from other firms that offer energy efficiency, like consulting firms and equipment contractors, is the concept of performance-based contracting. When an ESCO undertakes a project, the company's compensation, and often the project's financing, are directly linked to the amount of energy that is actually saved. Typically, the comprehensive energy efficiency retrofits inherent in ESCO projects require a large initial capital investment and offer a relatively long payback period. The customer's debt payments are tied to the energy savings offered under the project so that the customer pays for the capital improvement with the money that comes out of the difference between pre-installation and post-installation energy use and other costs. Another critical service that ESCO provides is that of education of customers about their own energy use patterns in order to develop an "energy efficiency partnership" between the ESCO and the customer. A primary purpose of this partnership is to help the customer understand how their energy use is related to the business that they conduct.

B. Proposals for advancing renewable energy technologies in Grenada

The need for enacting policies to support renewable energy is attributed to a variety of “barriers” or conditions that prevent investments from occurring at the pace necessary to achieve the country’s renewable energy targets. These barriers have been identified in the previous section. Often the result

of barriers is to put renewable energy at an economic, regulatory, or institutional disadvantage relative to other forms of energy supply.

Many of these barriers are considered to be “market distortions” that unfairly discriminate against renewable energy, while others have the effect of increasing the costs of renewable energy relative to the alternatives. Barriers are often quite situation-specific in any given region or country. However, there are a range of policies that can be used to both reduce and remove these barriers. At a stakeholder consultation held in November in Grenada stakeholders were presented with a wide range of policies that could be used to reduce and/or remove identified barriers to the deployment of renewable energy technologies and advance the renewable energy sector. The policies that are applicable to Grenada are presented below.

Policies and strategies that will be presented in this section and whose specific goal is to promote renewable energy fall into three main categories:

- Price- setting and quantity-forcing policies, which mandate prices or quantities
- Investment cost reduction policies, which provide incentives in the form of lower investment costs
- Public investments and market facilitation activities, which offer a wide range of public policies that reduce market barriers and facilitate or accelerate renewable energy markets

1. Price-setting and quantity-forcing policies for consideration by the Government of Grenada

Revision of the Electricity Supply Act (ESA) of 1994

The revision of the Electricity Supply Act will facilitate and encourage electric power production by small power producers using renewable resources to reduce the dependence on imported fossil fuels of Grenada, facilitating an increase of renewables in the country’s energy mix. The revision of this Act is expected to provide for the legislation of renewable electricity portfolio standards which will set the amount of renewable energy that GRENLEC must use to generate electricity at different points now and in the future towards achieving the national energy policy goal of 20 per cent renewable energy in the energy mix by 2020. The revision of the Act will create provision for GRENLEC to be able to purchase power from small renewable generators and co-generators, known as “qualifying facilities,” through contracts.

Electricity portfolio standards

With respect to electricity portfolio standards, the Government will stipulate through a revised ESA the minimum percentage of generation sold or capacity installed be provided by renewable energy (this already is a target in the National Energy Policy 2011). GRENLEC will then be required to assist with the achievement of this target and this can be done either through self generation or power purchases from other producers. Two types of standards will need to be considered: capacity-based standards which set a fixed amount of capacity by a given date, while generation-based standards mandate a given percentage of electricity generation that must come from renewable energy. Both of these standards can be employed in Grenada.

Electricity feed-in laws

Electricity feed-in laws should also be considered by the Government along with electricity portfolio standards. Electricity feed-in laws set a fixed price for utility purchases of renewable energy. For example, renewable energy producers could sell their power to utilities at a determined percentage of the retail market price. GRENLEC could be required to purchase the power from the supplier. Feed-in laws tend to lend themselves to a rapid increase in installed capacity and development of

commercial renewable energy markets. This may be a good policy to pursue given that Grenada would need to substantially increase renewables in the energy mix to meet its current 20 per cent target by the next seven years.

2. Investment cost reduction policies for consideration by the Government of Grenada

A number of policies are designed to provide incentives for voluntary investments in renewable energy by reducing the costs of such investments. These policies can be characterized as falling in five broad categories, policies that:

- Reduce capital costs up front (via subsidies and rebates)
- Reduce capital costs after purchase (via tax relief)
- Offset costs through a stream of payments based on power production (via production tax credits)
- Provide concessionary loans and other financial assistance
- Reduce capital and installation costs through economies of bulk procurement

It is well known that the initial cost of investing in renewable technologies can be prohibitive so that there is a need to address ways to avert and/or reduce these costs to consumers. Below, those investment cost reduction policies that are applicable to Grenada will be presented.

Rebates

Reduction in the initial capital outlay by consumers for renewable energy systems such as solar water heaters and/or photovoltaic systems, small wind generators, passive solar, biomass, and fuel cells can be accomplished through rebates. These subsidies could be used to “buy down” the initial capital cost of the system, so that the consumer sees a lower price. Consideration could be given to households and small businesses including hotels. Rebates could be combined with low or no-interest loans or soft loans.

Tax relief policies

Tax relief policies that can be considered by Grenada for renewable energy advancement include:

- **Investment tax credits** for renewable energy which are usually offered for businesses and residences. Currently, Grenada provides investment tax credits to the hotel industry, hospitals, university, and these concessions could be expanded for renewable energy as well as for energy efficient equipment.
- **Accelerated depreciation** which would allow renewable energy investors to receive the tax sooner than under standard depreciation rules. The effect of accelerated depreciation is similar to that of investment tax credits whereby businesses would be able to recover investments in solar and wind by depreciating them over a period of five years, rather than the 15- to 20-year depreciation lives of conventional power investments. In pursuing this policy option, Grenada will need to ensure that increasing investments are coupled with long-term operating performance and maintenance.
- **Production tax credits** if implemented will provide the investor or owner of qualifying property with an annual tax credit based on the amount of electricity generated by that facility. By rewarding production, these tax credits encourage improved operating performance as well as energy conservation.
- **Sales tax incentives** are policies that will provide retail sales tax exemptions for eligible renewable energy systems and renewable fuels.

- **Loans** – Soft loan programmes should be considered to offer financing for the purchase of renewable energy equipment. Loans can be market-rate, low-interest (below market rate), or forgivable. Funding could come from a variety of sources, including revolving funds, development partners or even through the PetroCaribe fund. Financing could be a fraction to 100 per cent of a project. Some loan programs have minimum or maximum limits, while others are open-ended. In some developing countries, notably India, China, and Sri Lanka, multilateral loans by lenders such as the World Bank have provided financing for renewable energy, usually in conjunction with commercial lending. One of the most prominent examples is the India Renewable Energy Development Agency (IREDA), which was formed in 1987 to provide assistance in obtaining international multilateral agency loans and in helping private power investors obtain commercial loans. Information on these could be accessed towards obtaining lessons learned and building on success factors in India. Lessons learned could range from building capacity of banks to assess the risks of providing these kinds of loans to ensuring that the electricity act is attractive enough and contains portfolio standards that would encourage investors to want to invest in renewable energy.

In Latin America and the Caribbean, loans are often done through micro financing. Loans are then made available for retrofitting small and medium-sized enterprises to facilitate energy efficiency, energy conservation and the introduction of alternative energy sources. Renewable energy loans can take many forms. Residential loans may range from US\$ 500 to US\$ 10,000 or more, while commercial and industrial loans may extend to millions.

3. Public investments and market facilitation activities for consideration by the Government of Grenada

Construction and design policies

Construction and design policies are building-code standards for renewable energy technologies such as photovoltaic installations, design standards evaluated on life-cycle cost basis, and performance requirements. This would require Grenada amending its country national building code to take into account energy efficiency in buildings.

Equipment standards and contractor certification

Equipment standards and contractor certification should be considered to ensure uniform quality of equipment and installation, increasing the likelihood of positive returns from renewable energy installations. Contractor licensing requirements will then ensure that contractors have the necessary experience and knowledge to properly install systems. Equipment certifications ensure that equipment meets certain minimum standards of performance or safety. This policy is already being considered by the Government of Grenada and will require building the capacity of the Grenada Bureau of Standards to develop standards that support renewable energy equipment and technologies.

Government procurement policies

Government procurement policies can promote sustained and orderly commercial development of renewable energy. Governmental purchase agreements can reduce uncertainty and spur market development through long-term contracts, pre-approved purchasing agreements, and volume purchases. Government purchases of renewable energy technologies in early market stages can help overcome institutional barriers to commercialization, encourage the development of appropriate infrastructure, and provide a “market path” for technologies that require integrated technical, infrastructure, and regulatory changes.

Solar and wind access laws

Consideration should be given to solar and wind access laws and be included in the development of national spatial plans. Renewable access laws address access, easements, and covenants. Access laws provide a property owner the right to continued access to a renewable resource. Easements provide a privilege to have continued access to wind or sunlight, even though development or features of another person's property could reduce that access. Easements are often voluntary contracts, and may be transferred with the property title. Covenant laws prohibit neighbourhood covenants from explicitly restricting the installation or use of renewable equipment. Policy mechanisms include access ordinances, development guidelines addressing street orientation, zoning ordinances with building height restrictions, and renewable permits.

4. Power sector restructuring policies of relevance to the Government of Grenada

Power sector restructuring could have a profound effect on electric power technologies, costs, prices, institutions, and regulatory frameworks for Grenada.

Creation of an independent power producer (IPP) frameworks or self-generation by end-users and distributed generation technologies

The development of an IPP framework in Grenada will allow more and more end-users, from large industrial customers to small residential users, to generate their own electricity. Their self-generation will offset purchased power allowing the IPPs to even sell surplus power back to the grid. Renewable energy is well suited to self-generation, and IPP frameworks can spur renewable energy investments. Of course in the introduction of IPP frameworks, consideration must be given to the fact the one of main aims of introducing renewables is to reduce the price of electricity to consumers. So it must be recognized (and accommodations made) that as more consumers generate their own power, the utility's revenue may fall and therefore, the inherent fixed costs of the electricity network will need to be amortized across fewer and fewer customers, thereby increasing costs to these remaining consumers.

Unbundling of generation, transmission and distribution

GRNLEC is vertically integrated, including generation, transmission and distribution functions. Consideration could be given to restructuring or “unbundling” into different commercial entities, some retaining a regulated monopoly status (particularly distribution utilities) and others starting to face competition (particularly generators). Unbundling can provide greater consumer incentives to self-generate using renewable energy. If retail tariffs are “unbundled” as well, so that generation, transmission and distribution costs are separated, customers have more incentive to self-generate, thereby avoiding transmission and distribution charges.

5. Distributed generation policies that are of relevance to Grenada

Distributed generation avoids some of the costs of transmission and distribution infrastructure and power losses, which together can total up to half of delivered power costs. Whilst policies to promote distributed generation—including net metering, real-time pricing, and interconnection regulations do not apply only to renewable energy, they can strongly influence renewable energy investments. Net metering will be discussed here as this is possibly the distributed generation policy that would be of relevance to Grenada.

Net metering

Net metering allows a two-way flow of electricity between the electricity distribution grid and customers with their own generation. When a customer consumes more power than it generates, power flows from the grid and the meter runs forward. When a customer installation generates more power than it consumes, power flows into the grid and the meter runs backward. The customer pays only for the net amount of electricity used in each billing period, and is sometimes allowed to carryover net electricity generated from month to month. Net metering allows customers to receive retail prices for the excess electricity they generate at any given time. This encourages customers to invest in renewable energy because the retail price received for power is usually much greater than it would be if net metering were not allowed and customers had to sell excess power to the utility at wholesale rates or avoided costs. Electricity providers may also benefit from net metering programs, particularly with customer-sited photovoltaics which produce electricity during peak periods. Such peak power can offset the need for new central generation and improve system load factors. Net metering has been tried in Grenada with limited success. With the sale of GRENLEC and the new national energy policy as well as the revision of the electricity act along with the introduction of an IPP framework it may be worthwhile for the Government to revisit and/or redesign a net metering policy.

C. Other requirements for deploying renewable energy technologies for consideration by the Government of Grenada

Deploying renewable energy technologies at a rapid pace in Grenada as well as other parts of the the Caribbean will require addressing the many barriers presented above, including:

- Development of supportive policy and regulatory frameworks
- Securing public sector commitment to act as leaders in the deployment of renewable energy technologies in public sector applications such as in hospitals, schools and other government buildings
- Strengthening local capacities and entrepreneurship
- Transferring technologies
- Increasing access to affordable financing and consumer credit
- Transitioning from traditional biomass to modern use of biomass, cleaner fuels,
- More efficient use of biomass residues for power generation and transport, including growth of dedicated crops
- Increasing deployment and reducing costs of solar, wind, geothermal, wave, tidal, and other renewable energy sources

D. Conclusion

Grenada, like the rest of the Caribbean region possesses a great potential for power generation from renewable energy sources and improvements in energy efficiency. Grenada has excellent good geothermal prospects, and boasts a tropical climate presenting both wind and solar resource availability. Although the measurable impact on carbon emissions might be small as compared to the world as a whole, Grenada as a small island developing State presents many opportunities to demonstrate renewable energy, energy efficiency, and low-carbon energy practices and technologies that could scale up to make a great impact on the rest of the region and indeed in other SIDS. Apart from the environmental benefits, another major opportunity is the reduction of dependence on imported fossil fuels for power generation and use as transport fuel. The high cost of this foreign-sourced power has been a drain on this economy and both energy efficiency and renewable energy deployment presents great opportunities for advancing international competitiveness, economic growth, poverty reduction and environmental sustainability.

Bibliography

- AOSIS (Alliance of Small Island States) (2012). Barbados Declaration on Achieving Sustainable Energy for All in Small Island Developing States (SIDS), Bridgetown, 8 May
- Brown, Marilyn A. and Sharon Chandler (2008). “Governing Confusion: How Statutes, Fiscal Policy, and Regulations Impede Clean Energy Technologies”, Georgia Tech, Working Paper #28
- CARICOM (Caribbean Community) (2013). “CARICOM Energy Policy”. 1 March.
- CARICOM (Caribbean Community), World Watch Institute and IADB (Inter-American Development Bank) (2013). Caribbean Sustainable Energy Roadmap (C-SERMS), Phase 1. Summary and Recommendations for Policymakers, CARICOM
- Government of Grenada (2013). 2013 Budget Statement by Dr. the Hon. Keith Mitchell, Prime Minister and Minister of Finance and Energy
- Government of Grenada (2011). The National Energy Policy of Grenada: Low Carbon Development Strategy for Grenada, Carriacou and Petite Martinique
- Grenada Electricity Services Limited (2012) Annual Report 2012
- Grenada Electricity Services Limited (2011) Annual Report 2011
- Interstate Renewable Energy Council, Inc. (2012), “12,000 MW of Renewable Distributed Generation by 2020: Benefits, Costs and Policy Implications”, July.
- International Renewable Energy Agency (2012). Grenada Renewables Readiness Assessment
- International Renewable Energy Agency (2012). Renewable Energy Country Profiles, November
- Kammen, Daniel and Rebekah Shirley (2011). “Renewable Energy Sector Development in the Caribbean: Current Trends and Lessons from History”, University of California, Berkeley United States of America
- Mendonça, Miguel and James Corre (n.d.) “Success story: Feed-In Tariffs Support renewable energy in Germany”, [online]
<<http://www.climateparl.net/cpcontent/pdfs/080603%20FIT%20toolkit.pdf>> [date of reference: 7 December 2013]
- National Renewable Energy Laboratory and Organization of American States (2011), “Energy Policy and Sector Analysis in the Caribbean (2010–2011), Assessing Antigua and Barbuda; the Bahamas, Dominica, Grenada, Saint Lucia, Saint Kitts and Nevis; and Saint Vincent and the Grenadines
- Nexant (2010), “Caribbean regional electricity generation, interconnection, and fuels supply strategy” [online] Washington, DC: World Bank, <<http://documents.worldbank.org/curated/en/2011/03/13747269/caribbean-regional-electricity-generation-interconnection-fuels-supply-strategy>> [date of reference: 10 December 2013]

- Painuly, Jyoti (2002), “Implementation of Renewable Energy Technologies – Opportunities and Barriers”, UNEP Collaborating Centre on Energy and Environment, Denmark
- UNDESA (United Nations Department of Economic and Social Affairs), Expert Group on Renewable Energy (2005). *Increasing Global Renewable Energy Market Share: Recent Trends and Perspectives*, United Nations Foundation

